MODERN Machine Shop

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DECEMBER, 1943

Contents

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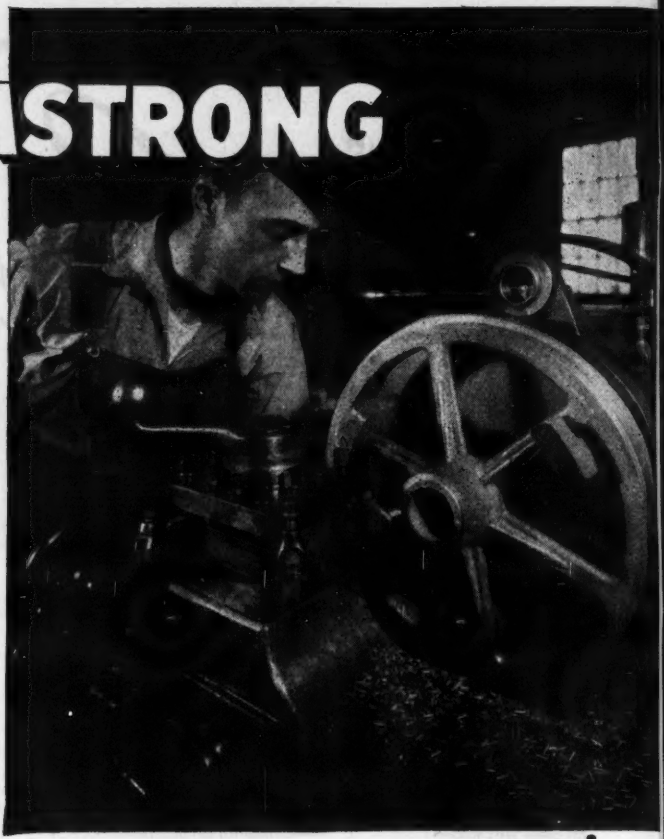
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MODERN Machine Shop

DECEMBER, 1943 VOL. 16, NO. 7

CINCINNATI, OHIO

We Present ---

— as the feature article in this month's issue — a story on the production of Timken roller bearings and their use in modern weapons of war. Photographs show many of the more important operations involved in the manufacture of these bearings.

— on page 138 — an article of particular importance to users of air tools, entitled "Do You Use Air Grinders?" This article illustrates and tells in detail how the proper application and operation of air tools will result in a definite contribution to the war effort.

— on page 160 — the eighth of Noel Brindle's articles on the design and application of tools for the automatic screw machine. In this particular installment, the discussion on knurling tools is continued, with the discussion revolving around two workpieces which illustrate the use of typical standard knurl holders.

— on page 180 — "The Circus Powerplant Keeps 'Em Flying," a story by Robert Clark illustrating and describing the Army's version of the mobile electric generating plant used by traveling circuses and telling how these units are being employed to furnish light and power to airfields not far from enemy territory.

— on page 190 — an article from A. S. Eves, Chief Field Engineer, Perfection Tool and Metal Heat Treating Company, Chicago, Ill., explaining how tools can be saved through greater cooperation between the toolmaker and tool hardener. This timely article should be thoroughly read by every producer of tools.

— on page 208 — a number of excellent "kinks" and "short-cuts" for the shopman, under the heading "Ideas from Readers."

— on page 222 — a department featuring descriptions and illustrations of tools and equipment designed to speed the production of a variety of parts.

— on page 232 — our usual illustrated and descriptive announcements of new shop equipment and materials, followed by the monthly cartoon and other features.



Fig. 1—Steel Pouring From Electric Furnace as Inspector—Engulfed in Cloud of Smoke From Molten Steel — Uses Optical Pyrometer to Determine Temperature of Heat

Timken Roller Bearings Go To War

Presented here is a series of photographs which show many of the more important operations in the manufacture of roller bearings.

By BARTLETT WEST

OF all the single items that are necessary to the manufacture of modern weapons of war, one of the most important is the anti-friction bearing of either ball or roller type. Not only are ball and roller bearings used in the building of the machine tools with which the parts for these fighting units are manufactured, but such bearings are used in the fighting units themselves.

During the past two years it has become more and more apparent that victory will depend largely upon mastery of the skies, and mastery of the skies is dependent largely upon the amount of horsepower that can be delivered to the propeller. It is here—and the statement is made literally—that anti-friction bearings take up the load and eliminate all but a negligible amount of the friction inherent

in the operation of the crankshafts, camshafts, and other moving parts.

Timken roller bearings, with which this article deals, are used in practically every one of Uncle Sam's war birds in one or more applications. In some of the large four-motor bombers as many as 238 Timken bearings are used, definitely increasing the speed and power of the engines and the load-carrying capacity.

Success in sea fighting, also, depends to a large extent upon the maneuverability of fighting craft — and here, again, the anti-friction bearing serves well. Diesel motors, in the lighter craft, and steam turbines in heavier craft both depend upon anti-friction bearings to aid in the delivery of maximum horsepower at the propellers.

As important as the maneuverability of the ship is the maneuverability of the huge guns which determine the effectiveness of the ship as a fighting unit, and here the roller bearing does a magnificent job. The whole gun turret rides on a huge roller bearing and does it so easily that a comparatively small motor can supply all the power required to swing the turret to the desired position.

In addition to the applications referred to, Timken roller bearings are saving labor and power in the operation of pumps, windlasses, gear drives, capstans, hoists, cranes, winches, and other operating parts of fighting craft equipment.

The anti-aircraft gun is another highly important weapon which depends for its effectiveness upon the ability to swing into action with ease, speed and precision. And this gun is another unit that rides upon a huge roller bearing. Similar bearings of varying sizes are used in traversing mechanisms, trunnions, elevating mechanisms, and many other places.

The anti-friction bearing doesn't appear to be a very complicated piece of equipment, but there is more to the ball or roller bearing than meets the eye. Timken roller bearings, for instance, are made from steel that is especially compounded for this purpose, and processed to give it the qualities of strength and endurance that will enable these bearings to "stand the gaff" under the gruelling demands of heavy duty service.

As many as 28 Timken roller bear-

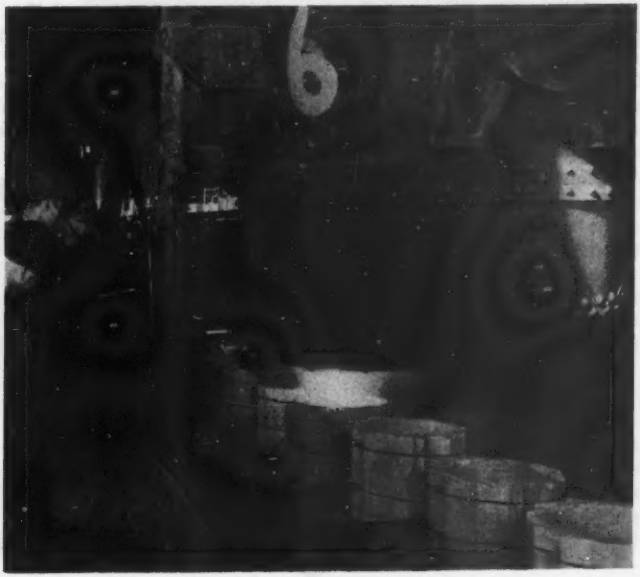


Fig. 2—Here the Steel is Being "Teemed" from the Huge Ladle into Ingot Molds While Inspector Checks Temperature with Optical Pyrometer



Fig. 3—White-Hot Ingot Being Removed from Soaking Pit Where It has Attained a Rolling Temperature of 200-2400 Degrees Fahr. It Will Now Be Taken Direct to the Blooming Mill for Rolling

ings are used in a fighting tank, among these being the large bearing upon which the tank turret revolves. Timken bearings in quantities varying from 14 to 50 are used in cargo trucks, half-trac trucks, reconnaissance cars, scout and officers' cars, and other mobile units of the army. In fact, there is hardly a mechanical unit of any size that does not include in its assembly one or more Timken tapered roller bearings.

Due to the fact that the entire production of Timken roller bearings is now requisitioned for use in fighting equipment, the quality of the steels used in these bearings is rigidly controlled by the Government. However, normally SAE Nickel-Molybdenum Alloy Electric Furance Steel is used for the smaller sizes of bearings, and Krupp steel for the larger sizes. Both are carburizing steels.

The steel from which Timken roller bearings are made is produced in electric furnaces. The electric furnace provides certain definite advantages for the production of high grade steels, among which is the ability to control the atmosphere so that the steel may be thoroughly deoxidized in the furnace.

When a heat of steel, of proper composition and heated to the correct melting temperature, is ready to be



Fig. 4—Power-Driven Rollers Feed the Ingot into this 35-Inch Blooming Mill Where It will be Reduced to a Long, Slender Bloom

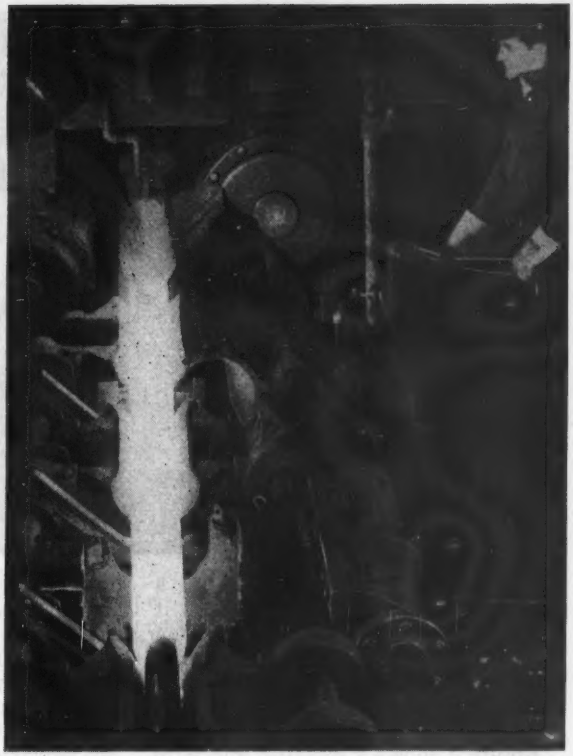


Fig. 5—The Bloom has now Been Rolled to a Long, Solid, Cylindrical Billet which is Being Pierced in this Mannesmann Piercing Mill. When the Mandrel is Withdrawn the Billet has Become a Tube

poured into the huge ladle, the ladle is brought up to the furnace by an overhead electric crane and positioned under the furnace spout. Then the furnace is slowly tilted into tapping position and the molten metal is allowed to flow in a steady stream into the ladle, as shown in Fig. 1.

Shown standing at the left in Fig. 1 is a metallurgist - inspector who is using an optical pyrometer to determine the temperature of the steel as it pours from the furnace. (The haziness of the picture is due to the smoke that is pouring up from the molten steel.) The temperature of the "melt" can be determined with fairly close accuracy by the use of the optical pyrometer, the principle of the instrument being based upon established physical laws which involve measurement of the radiant energy emitted.

When the ladle is filled to the desired point with molten steel, it is moved along over a line of ingot molds, pausing over each mold long enough to fill or "teem" the mold with the liquid metal. With the ladle in position, one of the workmen moves a lever which controls the gate in the bottom of the ladle and thus permits the metal to pour out. In teeming, the workman must be expert enough to properly regulate the pouring rate so as to pour with a minimum of splashing in the mold, thus ensuring a good ingot surface.

When an ingot thus formed has solidified to such a point that it can be handled, the mold is broken away and the ingot is picked by the crane shown in Fig. 3 and placed in a pit that is maintained at a given temperature constantly. Here the ingot "soaks" until it is of even temperature throughout, at which point it is ready for working in the mill.

The illustration Fig. 4 shows the ingot after it has been placed in horizontal position on the power-driven rolls of a blooming mill, where it is fed back and forth through the rolls of the mill, the rolls being moved closer together with each pass until

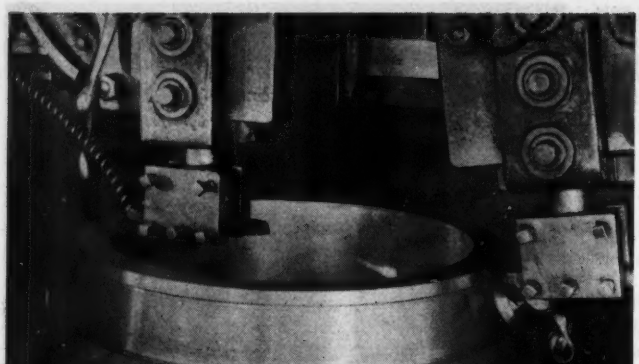


Fig. 6—Roller Bearing Cone in Process of Being Finish Turned and Bored for Roller Neck Bearing. One Tool Head is Taking Straight Cut Through the Bore While the Other Head Finishes the Taper Fit for the Rollers

the ingot has been worked out to a long, slender "bloom." At this point it gets some reheating in order to bring it back to working temperature, and then it is rolled to cylindrical shape and pierced to provide the hole thru the center which makes it a tube.

Figure 5 shows a piercing mill with a tube in position for piercing thru the axis. The piercing mandrel can be seen in the immediate foreground. After the mandrel has been withdrawn, the tube automatically rolls down the decline to the left of the sizing mill.

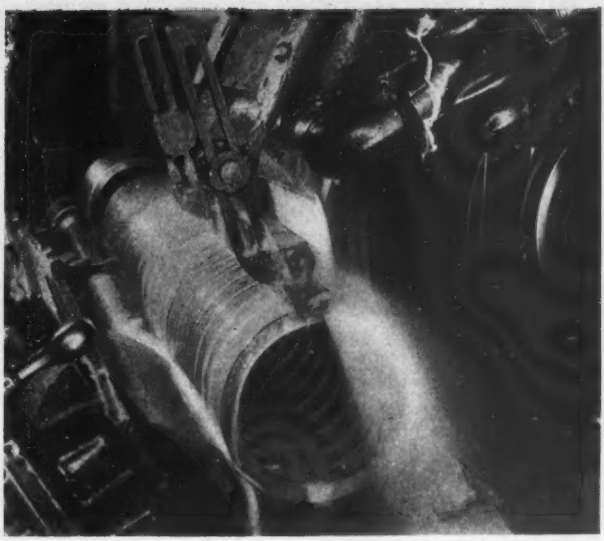
After sizing and cooling, the tubes are squared up on the ends and are now ready for processing in automatic screw machines. Seamless tubes made in the Timken Mills cover a size range of approximately 1½ inches O. D. to 10¼ inches O.D. Automatic screw machines that will take the complete range of sizes of tubes made in the Timken Mills are in operation in the Timken bearing plants.

To give the bearing parts the hard, wear-proof surfaces necessary to withstand the hard wear to which they will be subjected in service the parts are heat treated in the rotary carburizing furnaces shown in Fig. 7. Using gas as a carburizing agent, a glass-hard case is produced on the surfaces of the parts. An important factor in the operation of these furnaces is the ease with which the case composition can be controlled. By properly coordinating the factors of time, temperature and gas composition, the amount and penetration of the carbon can be varied to meet requirements.

In order to preclude the possibility of oxygen entering the retorts, they are fed a little more gas than is actually necessary to feed them, with the result that some of it is forced to escape through the outlet pipes in the door. As the gases pass out they are consumed as shown in the illustration. When the carburizing process is completed, the furnaces are tipped forward and the workpieces are dumped into the chute projecting from the floor in front of each furnace and thus pass into the quenching baths.

Immediately following the case-carburizing operation the parts are hardened, this process developing the fine-grain, high carbon surfaces which are so important in the ability to resist wear.

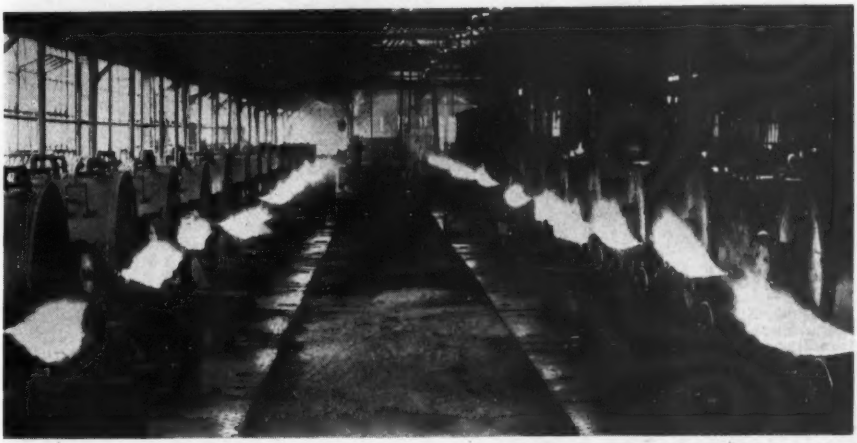
Fig. 8—Close-Up View of One of the Large Centerless Grinders Used to Finish Grind the Peripheries of Medium Size Bearing Cups



After the cones and races have been heat treated they are finished to size, within extremely close limits of precision, by grinding. The smaller parts are ground in the usual types of standard grinding machines, both cylindrical and internal.

Medium-size bearing cups are finished on the outside by grinding in the centerless grinding machine shown in operation in Fig. 8. The cups are fed in at one side of the machine, revolving as they pass thru between the grinding wheels and emerging at the opposite side finished to the size required. The very large cones and races are ground in machines that have been especially adapted for the purpose.

Fig. 7—Battery of Rotary Carburizing Furnaces Used in Heat Treating Bearing Parts to Produce Hard, Wear-Proof Surfaces with Tough Inner Cores. Plumes of Flame Consume the Exhaust Gases



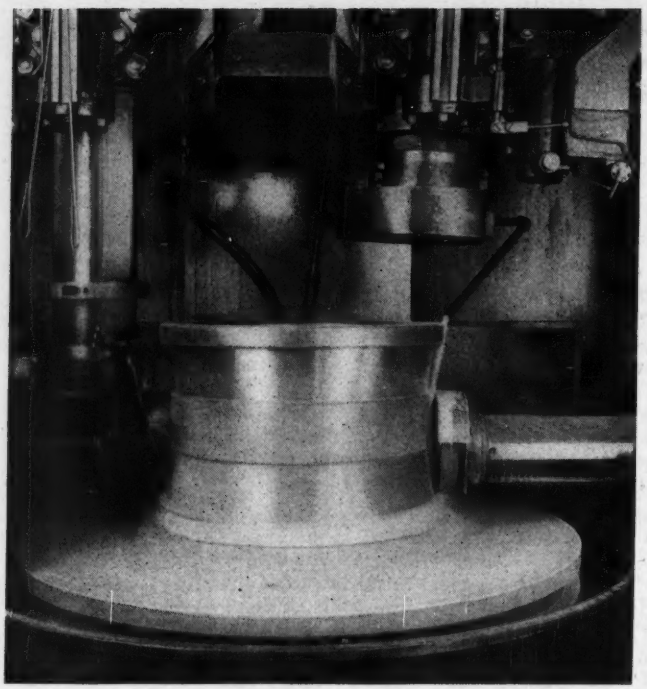


Fig. 9—This Precision Grinding Machine is Producing a Mirror-Like Surface on a Special Double-Tapered Roller Bearing Cone to be Used in a Steel Mill Roll Neck Bearing

One of these is shown in Fig. 9, which has been equipped with special spindles carrying grinding wheels. The cone shown in process of finishing in this machine is a special double tapered roller bearing cone that will be used in a steel mill roll neck bearing. The taper is ground by swinging one of the vertical spindles to the desired angle, and the horizontal surfaces are finished with a wheel on a spindle that is fed in from the side, as shown in the illustration.

While it is true that most roller bearings are of a size that enables them to be handled easily, it is equal-

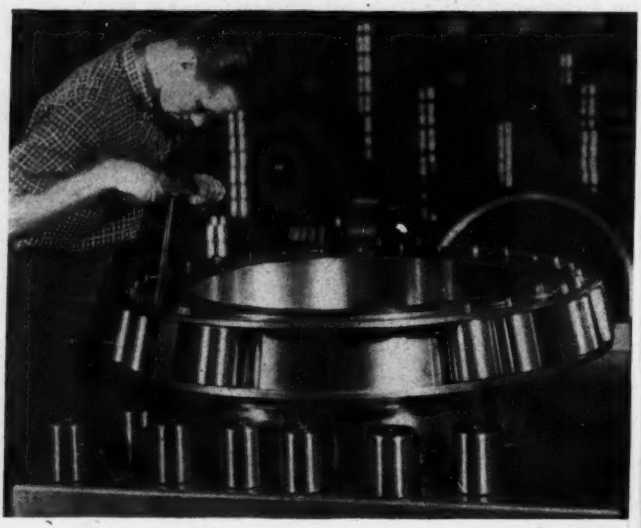
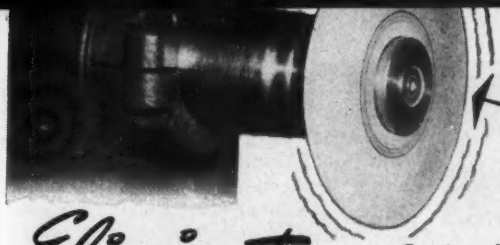
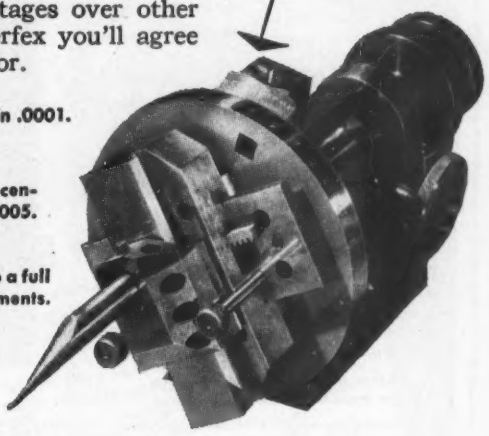


Fig. 10 — Assembling a Giant Steel Mill Roll - Neck Bearing. Handling and Assembly of Parts Must be Done with Extreme Care or Hundreds of Hours of Labor May Be Lost



Eliminate wheel chatter by dressing your wheels with this PERFEX DRESSER

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- ★ **Diamond automatically locates on center.**

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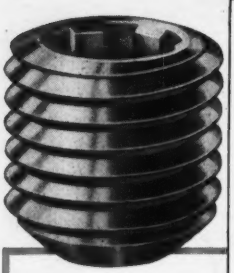
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1 Splines, like gears, provide faster, easier transmission of rotary power.

2 Splines permit tighter setting, maximum resistance to vibration.

3 Splines "grip" wrench, permit removal without damage to socket.

See THOMAS' REGISTER for Complete Facts, List of Product Applications.

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ly true that there is almost no limit to the size that bearings can be made. Bearings for gun turrets, tank turrets, and similar applications are many feet in diameter. While not among the largest, the bearing shown in process of being assembled in Fig. 10 is of a type for which the demand is continuous. This bearing will be

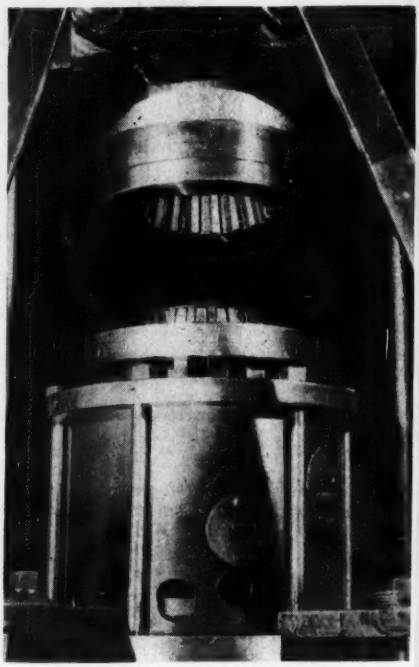
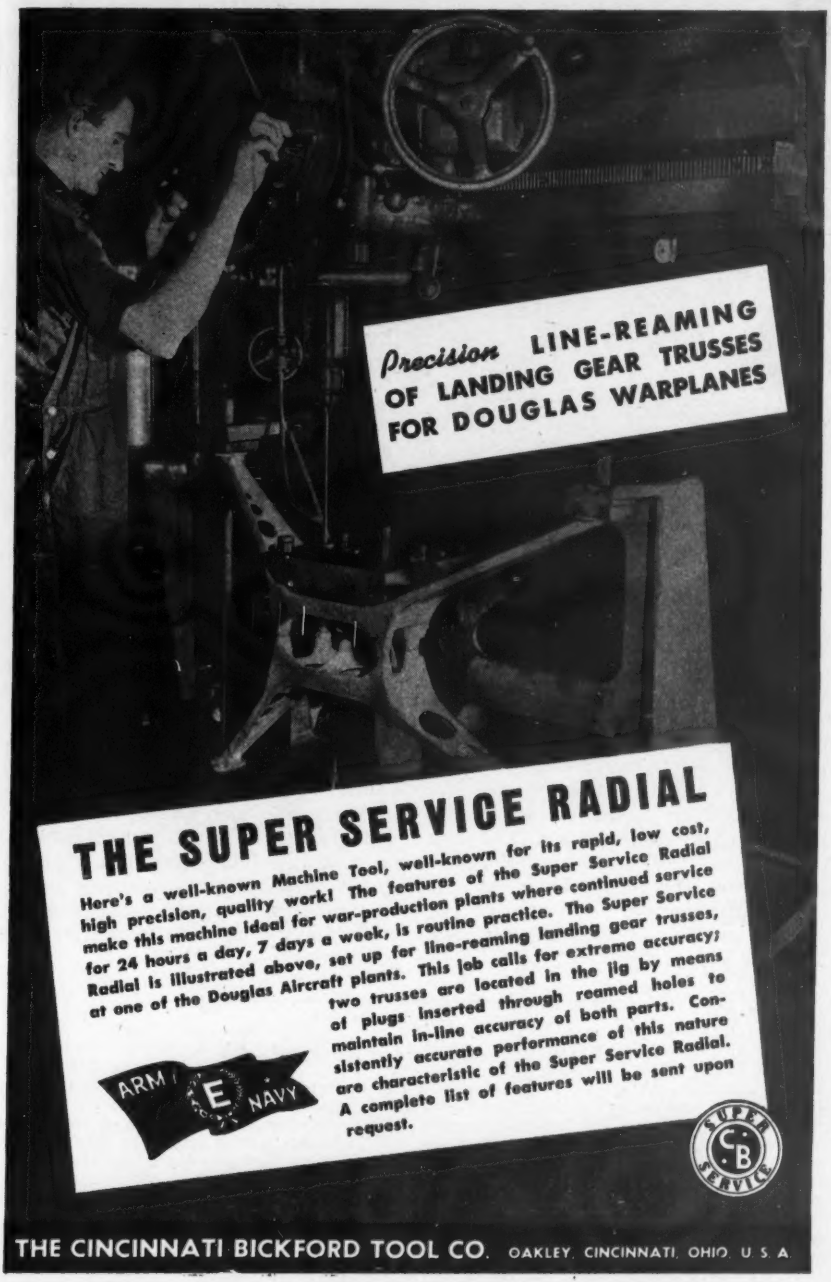


Fig. 11—Close-Up View of One of the Presses Showing the Die and Punch Used for "Winging" the Cages so that the Slots will Conform to the Curvature and Taper of the Rolls

used in a rolling mill for making steel, where the elimination of friction means an increase in the effective horsepower, and an increase in horsepower means more steel for ships and tanks and planes and guns.

A close-up view of one of the stamping presses showing the punch and die used to "wing" the cages for


Precision LINE-REAMING
OF LANDING GEAR TRUSSES
FOR DOUGLAS WARPLANES
THE SUPER SERVICE RADIAL
Here's a well-known Machine Tool, well-known for its rapid, low cost, high precision, quality work! The features of the Super Service Radial make this machine ideal for war-production plants where continued service for 24 hours a day, 7 days a week, is routine practice. The Super Service Radial is illustrated above, set up for line-reaming landing gear trusses, at one of the Douglas Aircraft plants. This job calls for extreme accuracy; two trusses are located in the jig by means of plugs inserted through reamed holes to maintain in-line accuracy of both parts. Consistently accurate performance of this nature are characteristic of the Super Service Radial. A complete list of features will be sent upon request.
ARMY E NAVY
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THE CINCINNATI BICKFORD TOOL CO. OAKLEY, CINCINNATI, OHIO, U. S. A.

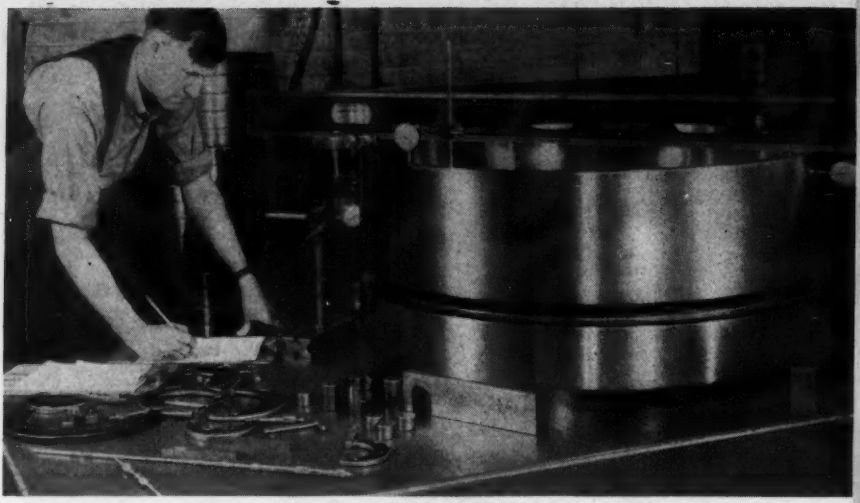


Fig. 12—Every Part of a Roller Bearing is Inspected, Both for Accuracy and for Finish, Before It is Released for Shipment

roller bearings is shown in Fig. 11. This operation ensures that the slots will conform to the curvature and taper of the rolls. This is a unique tool in that the punch is really the die, the punches being contained in the mechanism on the bedplate.

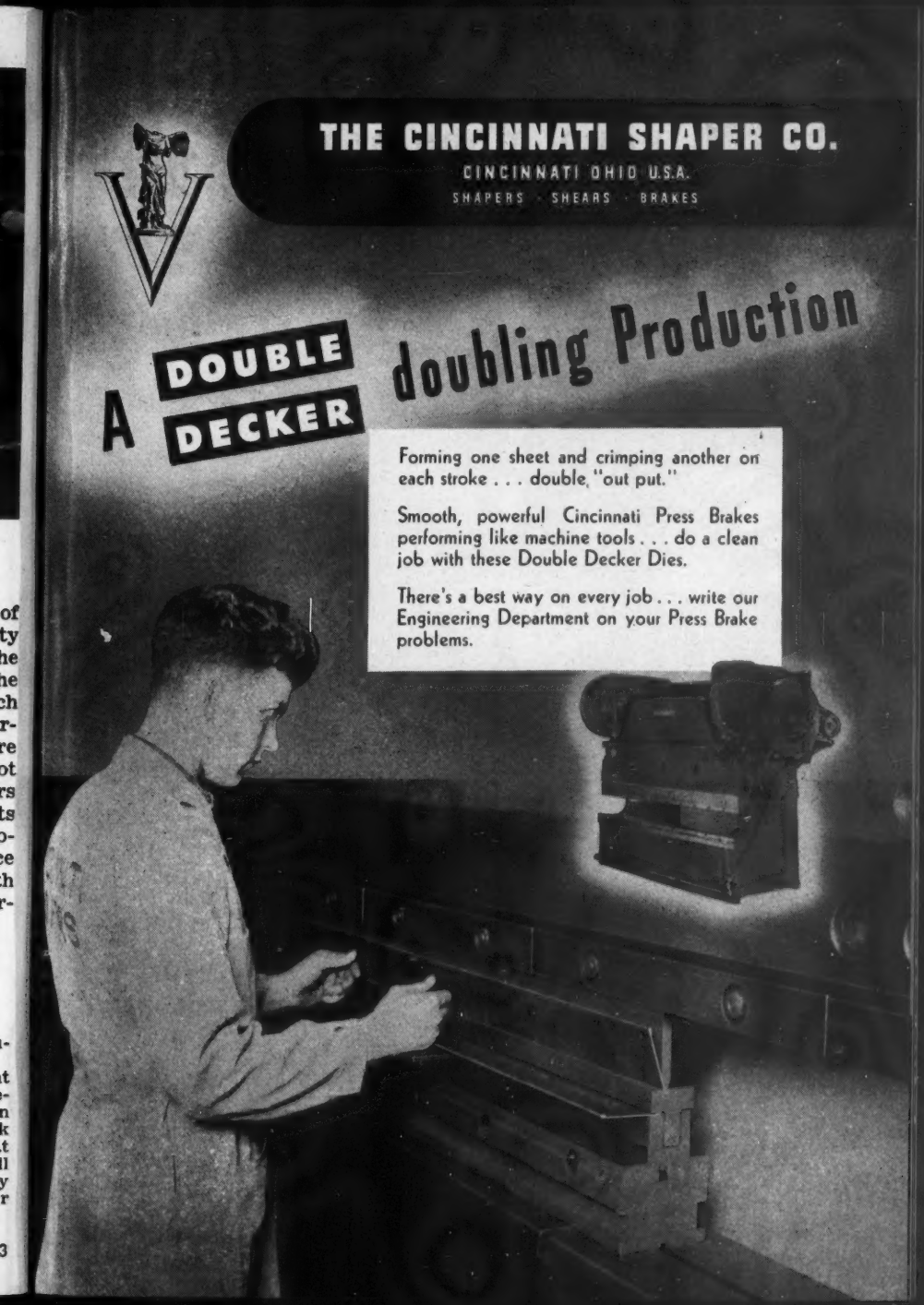
With the cage in position over the tapered part on the lower half of the die, the ram comes down and the "splines" in the upper half of the die fit over the cage. Then, as the ram continues on downward, the punches are forced outward, forming the cage as required.

An indication of the amount of checking necessary to ensure quality and perfect dimensions is seen in the photograph Fig. 12. Not only are the bearing parts inspected after each operation, but each completed bearing is thoroughly rechecked before being "O.K.'d" for shipment. Not only are precision gages, micrometers and other fine measuring instruments used in this inspection, but a profilograph, capable of measuring surface irregularities to within one millionth of an inch, is used to inspect the surface finish.

Cutting Tool Order Rescinded

Revocation of General Preference Order E-2-b, governing production and distribution of tools for cutting metal, was recommended by the Cutting Tool Industry Advisory Committee at a meeting in Washington with War Production Board representatives this week. The members of the committee expressed the opinion that the cutting tools industry henceforth should be governed only by this provisions of Priorities Regulation 1 and other general regulations of WPB.

The proposed revocation is not meant to indicate a reduction in the requirements for cutting tools, in the opinion of the committee, but merely that peak production has been reached and that while the need for cutting tools is still urgent, it is believed that the industry can function in a more effective manner without the order.

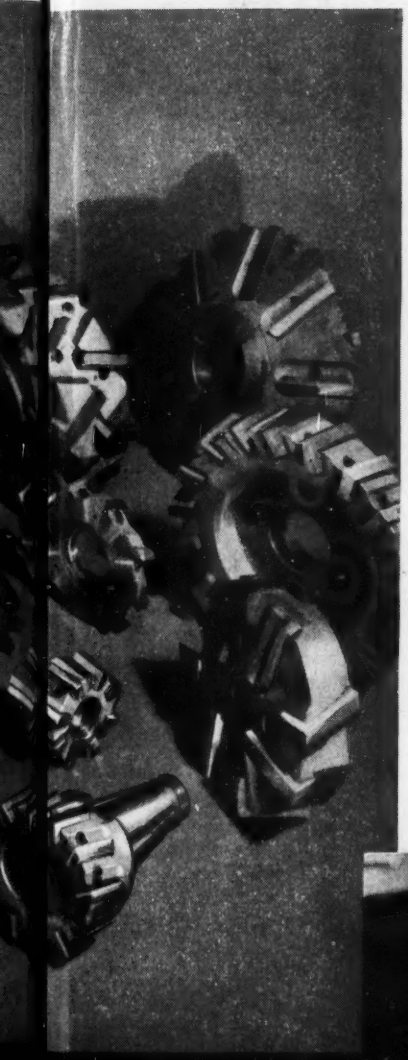

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•

As a natural consequence of meeting and solving many machine problems in milling, Ingersoll has developed a line of milling cutters in types and sizes to suit the conditions of the work. These include cutters for face-milling, end milling, side milling, slotting, channeling, slabbing, form-milling, and many types of boring.

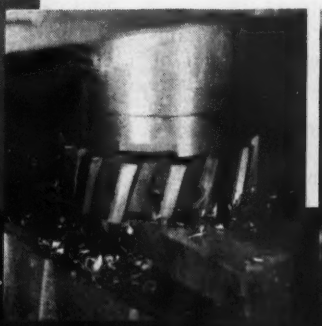
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If you are not entirely satisfied with the performance of your machines, investigate their tooling. One example of how you may benefit is described at the bottom of this page.

•

In stating the conditions of your work give (1) Kind of material being cut. (2) Width and depth of stock removal. (3) Nature of cut, such as face-milling, slotting, etc. (4) Type of machine drive. (5) And if convenient a sketch of the work-piece.

The same machine was used in both steel milling cuts shown below. The Shear Clear cutter on right, designed for jobs of this type, removed twice the amount of stock in less than half the time. The Shear Clear consumed less power and produced a smoother finish. Are you using the proper cutters in your shop?





ROCKFORD, ILL.



Fig. 1—In selecting an air grinder a particular type of tool should be picked out for a particular job. (Official OWI photo.)

Do You Use Air Grinders?

Proper application and operation of air tools will result in a definite contribution to the war effort.

THE very simplicity and dependability of the air-operated tool often results in its being treated like the proverbial step-child; as long as it continues to run it is given very little care and practically no service. Under peace-time conditions of producing for the market the rate of efficiency of a tool is of direct importance only to the plant management or, perhaps, the operator of the tool, but under war-time necessity of producing for the common safety the efficiency of every tool becomes a matter of national concern.

Air tools are subject to the same conditions of wear, lubrication, and safety that affect any other mechanical unit, and consequently should be inspected periodically to make sure that they are working properly. This advice comes from the Compressed Air Institute, which estimates conservatively that the amount of metal removed with the aid of air grinders could be increased from 50 to 80 per cent in a given time if the user were to apply the right abrasive, the correct tool, and the proper speed for a given job.

The present-day air grinder is a powerful tool; one which can be controlled with a high degree of flexibility. Light in weight, it can be operated long hours without tiring the user. In such war industries as the manufacture of aircraft and the airplane engine it has become indispensable. In fact, such striking improvements have been made in the efficiency of air grinders that, using one of the newer models of air tools, today a man can remove twice as much metal as he could four or five years ago, all conditions being equal.

But, according to the Compressed Air Institute, an important percentage of the value of air tools is being lost through operation at speeds which are too slow to be effective or too high to be safe. Many war plants not only run their tools at improper

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speeds, but select the wrong tools for the job as well, losing much time and material.

In selecting an air grinder a particular type of tool should be picked out for a particular job, as indicated by the illustration Fig. 1. The user should not buy "just any kind of an air grinder."

The most important factor in the selection of the tool is the type of material to be ground. There are 20 or more general classifications of grinders, and a great number of possible combinations of machines, wheel diameters, wheel speeds and abrasive materials. The most important factor is the type of material to be ground. A few examples may be cited briefly.



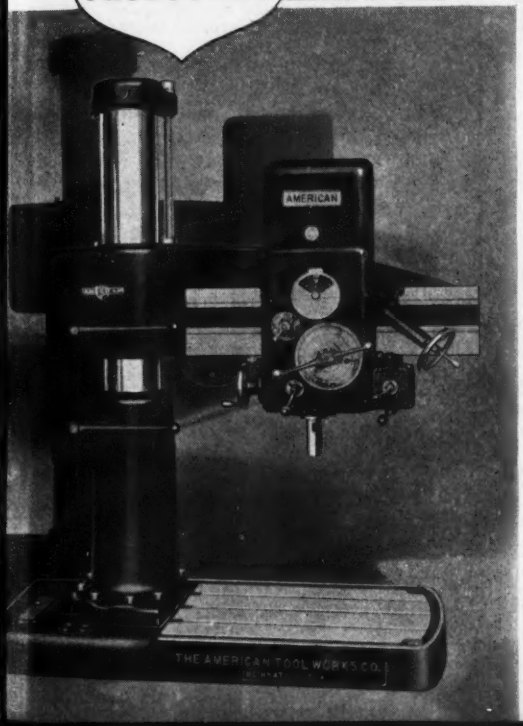
Fig. 2 — Testing the speed of an air grinder should be a routine job in every plant where they are used. (Photo courtesy Compressed Air Institute.)

A job may call for a wheel to develop a surface speed of 8,500 to 9,500 feet per minute, using an abrasive material of aluminum oxide with an elastic resinoid bond, with a very fine grit size. This combination would be

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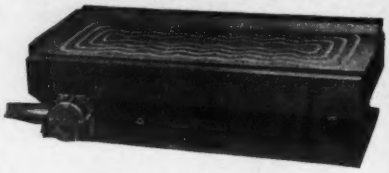
Cleaning of alloy steel billets may require an operating speed of 8,500 to 9,000 feet per minute, using an aluminum oxide abrasive with an elastic bond and a coarse grit size, while for cleaning gray iron castings a grinding wheel should operate at a speed of 5,500 to 6,000 surface feet per minute. This wheel would be made of silicon carbide of a medium grit size and a vitrified bond.



Fig. 3—The air tool should be run with a wheel guard under a bench to determine whether it will hold up under the desired speed. (Photo courtesy Compressed Air Institute.)

In snagging the webs on crankshafts, one practice is to use a wheel with an operating surface speed of 5,500 to 6,000 feet per minute. The abrasive material is aluminum oxide with vitrified bond and coarse grain size. Another practice is to run a wheel with a surface speed of 8,500 to 9,500 feet, but with a coarse-grain-

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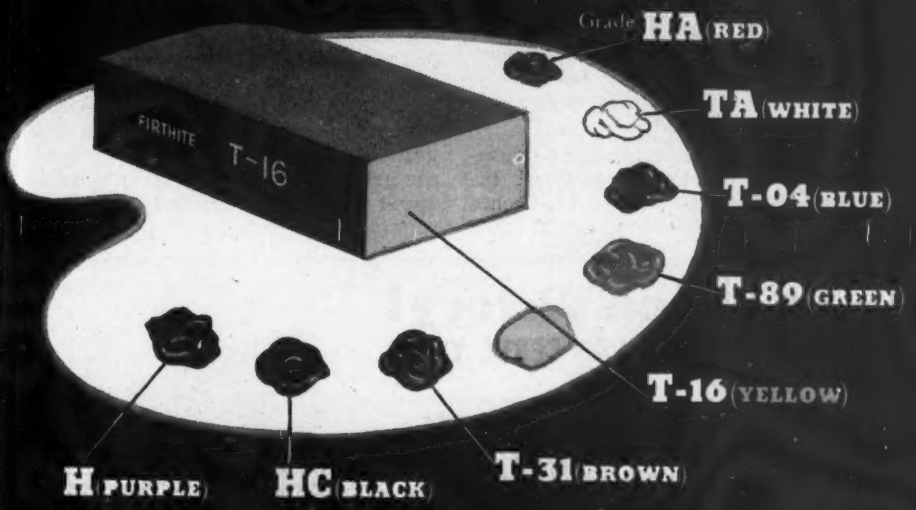


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ed aluminum oxide abrasive having a resinoid bond.

A wheel of coarse-grained silicon carbide might also be used for snagging aluminum or aluminum alloy castings. This would have a surface speed of 5,500 to 6,000 feet per minute and be held together by a vitrified bond.

The different materials, different grit sizes and different bonds all call for different speeds. It is always an advantage to use the largest diameter wheel and the largest machine that is convenient or safe, so that the job can be done faster, but it is important that a particular abrasive be run at its optimum speed. Furthermore, if a wheel is run too slowly, the abrasive is likely to be worn away instead of the metal.

In visits to several plants a representative of the Compressed Air Institute found cone wheels 2½-inches in diameter, which should run at 8,500 revolutions per minute, being used on air tools designed for 6-inch wheels and running at 6,000 revolutions per minute, or on tools suited to 8-inch wheels, running at 4,200. The cone wheels were being used because their shape was more suited to the job to be done, but the lower speed cut down the life of the wheel 30 to 40 per cent and reduced the amount of metal removed in a given time by as much as 33 per cent. This was certainly a substantial loss, chargeable to the use of improper air tool speed.

The speed of air tools is rated in revolutions per minute, whereas grinding wheel speeds are usually rated in terms of surface feet per minute. Limits of safety, in surface feet per minute, are indicated for each kind and type of grinding wheel, and it is dangerous—as well as useless—to operate grinding wheels at higher rates of speed than those indicated. A wheel running at 9,000 feet per minute, when

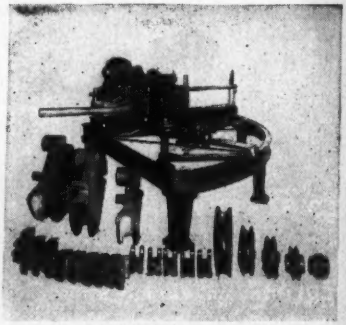
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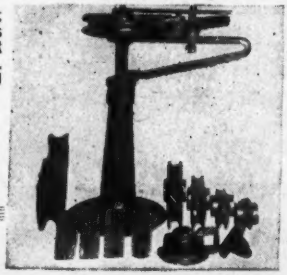


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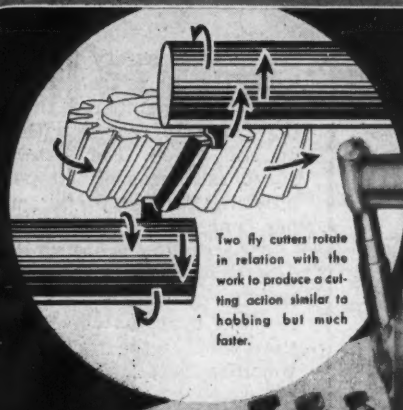
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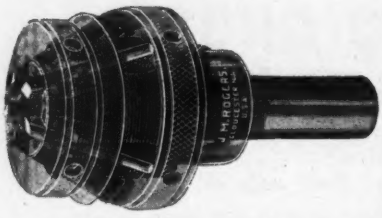
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the limit of safety is 6,000 feet, can explode with a tremendous force. It must be remembered that the bursting force increases with the square of the speed. For example, if the speed is increased 50 per cent, the bursting force will be increased 225 per cent, or 2¼ times.

Air grinders are stamped with figures showing the speeds at which they should run, and the maximum diameter and type of wheel for which the the speed of the tool is suitable. The specified rate of speed should never be exceeded except on written authority from the wheel manufacturer. If, for example, a manufacturer has specified that his grinder be used with a six-inch elastic-bonded wheel, a vitrified wheel of the same diameter must not be used because its tensile strength is so much less.

The Compressed Air Institute emphasizes these precautions because some users of air grinders have been found to be alarmingly lax with respect to safe operation.

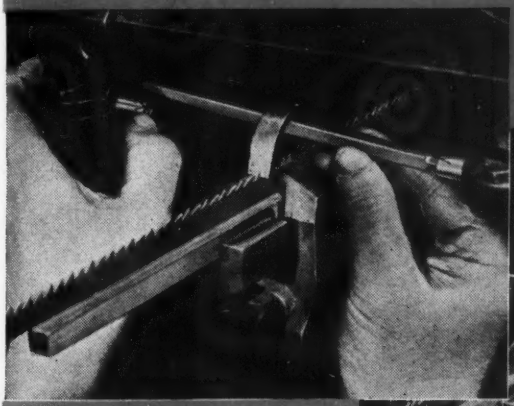
Manufacturers of grinding wheels are careful to adhere to the American Engineering Standards Safety Code, and before sending wheels out the wheels are tested at 50 per cent in excess of the rated speeds. But even so, every wheel should be tested by the customer before he permits it to be used because the manufacturer's precaution is not an absolute guarantee. The wheel may have been dropped and cracked while in transit or storage. In the illustration Fig. 2 an operator is shown using a speed indicator to test the speed of an air tool, and in Fig. 3 he can be seen testing out a new grinding wheel.

Before a new wheel is put into operation it should be run, enclosed in a wheel guard, at the full rated speed while being held under a table or bench. If it then bursts, the guard and table will deflect the flying fragments. Larger wheels should always be protected by wheel guards and the

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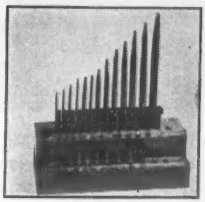


TURNING FILE. Push file forward to disengage shoulder end. Rotate file for fresh cutting edge. Release plunger; file springs back. Uniform saw teeth, maximum file life assured!

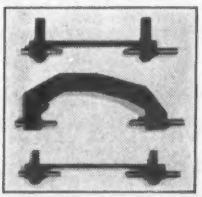
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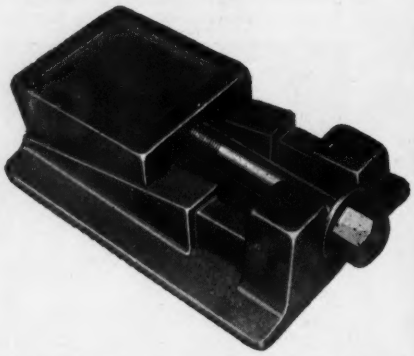


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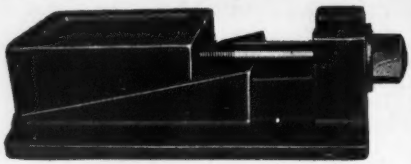
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operator should wear heavy goggles as shown in Fig. 4. When it is necessary for the operator to have his head close to the work, he should wear an aspirator as a protection against dust and fine particles. An operator wearing an aspirator is shown in Fig. 5.

To find the speed of a grinding wheel in surface feet per minute,



Fig. 4—Large wheels should always be protected by wheel guards and the operator's eyes should be protected by heavy goggles. (Photo courtesy Compressed Air Institute and The Timken Roller Bearing Co.)

multiply the diameter of the wheel in inches by 3.1416 and again by the r.p.m. of the tool spindle, then divide by 12. The table included below indicates the maximum peripheral speeds for various types and grades of wheels.

Grinding wheels must fit freely on their spindles. They should not be forcd on, nor should they be too loose. When the spindles and nuts



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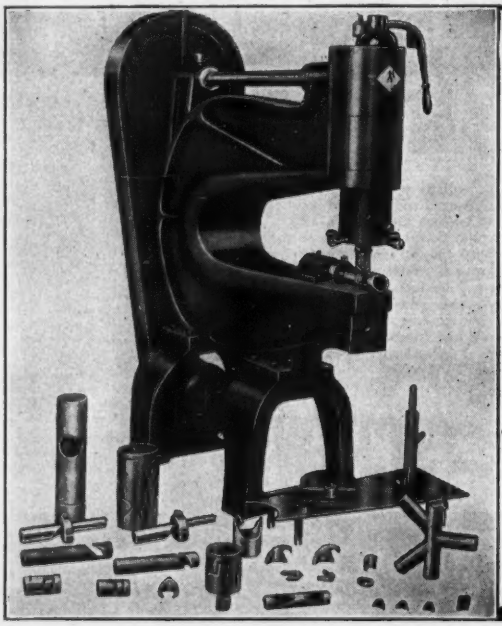
Types of Wheels	Vitrified and Silicate Bonds			Elastic Bonds		
	Soft F.P.M.	Med. F.P.M.	Hard F.P.M.	Soft F.P.M.	Med. F.P.M.	Hard F.P.M.*
Straight Wheels Taper Wheels	5,500	6,000	6,500	6,500	8,000	9,500
Recessed Wheels	5,500	6,000	6,500	6,500	8,000	9,500
Cylinder Wheels	4,500	5,500	6,000	6,000	8,000	9,500
Dovetail Wheels Dish and Flaring Cup Wheels Saucer Wheels	4,500	5,500	6,000	6,000	8,000	9,500
Deep Recessed Cup Wheels	4,500	5,000	5,500	6,000	7,500	9,000

*NOTE:—F.P.M.—Feet Per Minute.

are tightened, care should be taken to tighten them only enough to hold the wheel solidly, otherwise it might be damaged by the strain. The wheel should be mounted directly against the wheel collar, with blotters or paper washers on both sides.

In many instances a user of cone wheels fails to put a proper backing nut into the back wheel washer, in which case the cone screws down against the backing nut.

The grinder as well as the wheel should always be handled carefully,



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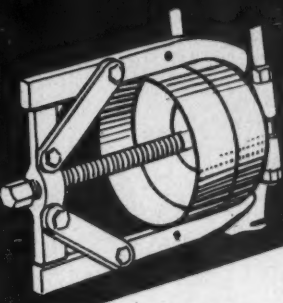
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Fig. 5 — For close grinding work the operator should be protected by an aspirator against small particles. (Photo courtesy Compressed Air Institute and Wright Aeronautical Corporation.)

for if either is dropped, serious damage might be incurred.

One important feature of the air grinder is that it accelerates to high speeds very quickly, and all but the very smallest are equipped with governors. Governors should operate on a wide range of inlet air pressures, maintaining free speed on pressures that vary as much as 30 pounds.

As compressed air grinding tools become worn through long use and the clearance between parts widens the load speeds will naturally drop, finally reaching the point where the optimum speed is unobtainable. When this point is reached, it is better to replace or repair the tool than to pay a workman to operate it in its inefficient condition.

Whenever an air grinder is repaired it should carefully be tested to determine the free speed before it is permitted to be used again. Every tool room should have a tachometer or speed counter to determine the free speed of the grinder, and this should never exceed that specified by the manufacturers.

To complete the safety precautions, the operator of the air grinder should always wear goggles, and the grinder itself should be equipped with an adequate wheel guard.

To obtain the most efficient use of air from an air line, it is essential that the line be of adequate diameter.



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If, for instance, a ½-inch hose is used instead of a ¾-inch on a length of 50 feet, the loss of power may be as great as 25 per cent. Power is also lost through couplings; therefore, it is important that their inside diameter be as large as practicable. An occasional and erroneous practice is to use a ¼-inch nipple for hose ½-

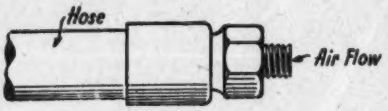


Fig. 6—This type of hose connection causes energy loss — nipple diameter too small for hose. (Drawing courtesy Compressed Air Institute.)

inch in diameter, as shown in Fig. 6.

The importance of keeping the air lines free of water is obvious. Marked savings can be made through installation of after-coolers and water traps. It is important to pitch the main in the direction of the flow of air so that the stream of air will not have to flow through pipes congested with moisture, and the down pipes or hose should always be tapped off from the top of air mains, to obtain air as

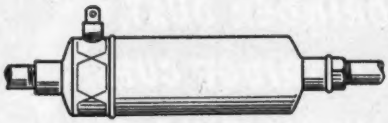
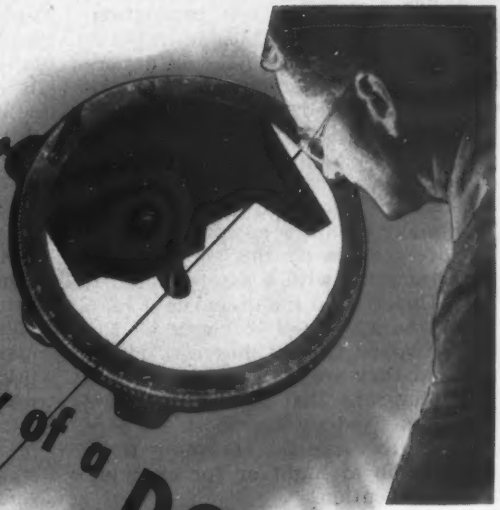


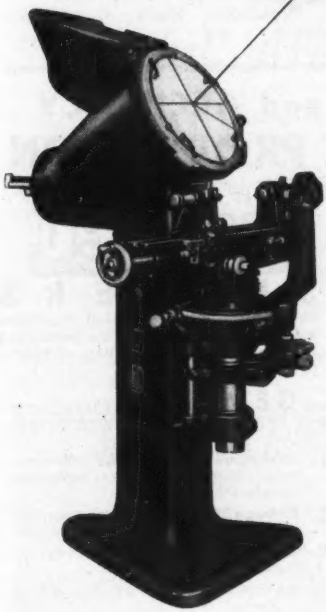
Fig. 7—Line lubricator inserted into air line improves operation of air grinder. (Drawing courtesy Compressed Air Institute.)

free from moisture as possible.

Before an air tool is used, it should be disconnected and the air line blown out to make sure the air flows freely and that all moisture and dirt are eliminated. The user also must make sure that the air strainer in the tool is always clean. He should never punch holes in the strainer, for obvious reasons. The tool should always be well lubricated, care being taken



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to use the proper grade of oil.

Under pressure of war production, daily inspection of air lines for leaks is most urgent, and it is likewise important that the air compressor plant be properly installed, with the idea of obtaining the coolest air possible. The proper maintenance of the compressed air plant is as important as the care for the individual grinders.

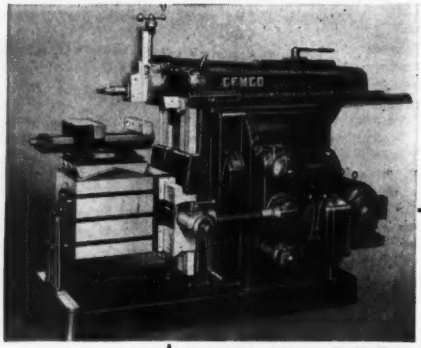
In many plants a competent maintenance man is on the job, working in conjunction with a safety committee. Under ideal maintenance a man should be appointed to check all the tools two or three times a week to see that they are oiled. But it all too often happens that after the repair man has fixed up the tools, no provisions are made for returning them to the crib at night or for checking their lubrication.

There was one instance of a grinder running at 22,000 revolutions per minute being lubricated with a little heavy grease in one end, once a week. These die grinders are bound to lose speed under such conditions and eventually fail. Such a grinder should be lubricated with light oil by means of line lubrication, as indicated in Fig. 7.

Plants that can have their maintenance men keep a constant check on the lubrication and adjust oil reservoir needles have much greater success with their maintenance and with keeping their tools up to full power. Maintenance of proper air pressure, lubrication and water in the air lines is directly the problem of the plant superintendent. The rank and file workman should not be relied upon to keep these under proper control.

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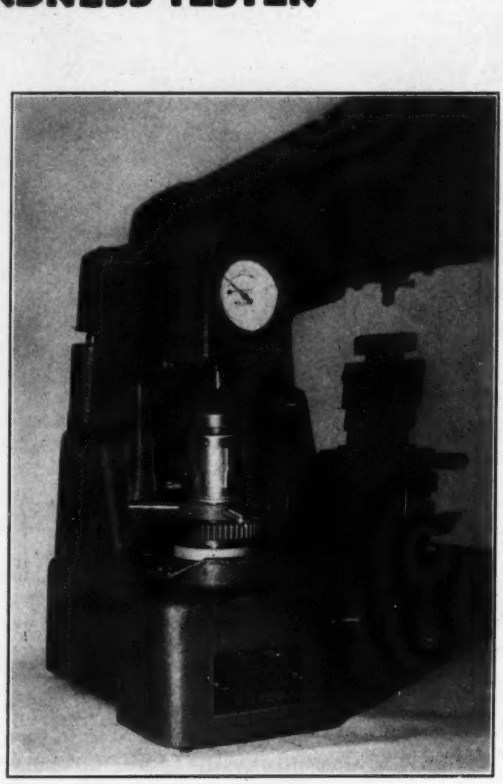
If you are working with micrometers reading to 1/1000" only, this is your opportunity to order a REED No. 901, as shown above, with vernier to 1/10000" for only $8.50 less 10%. The price is low but the quality is high. REED MICROMETERS HAVE BEEN MADE IN THE U. S. A. CONTINUOUSLY FOR 30 YEARS.

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Tooling the Automatic Screw Machine, VIII

More About Knurling Tools — Sequence of Operations — Feeds — Figuring Clearance Time

By NOEL BRINDLE

IN the previous article, several types of knurlings were presented and a variety of knurling operations performed on automatic screw machines were discussed. Illustrations showing many of the standard and special knurls and suitable holders were included. In this article, the discussion will revolve around two workpieces which illustrate the use of typical standard knurl holders.

Figure 31 shows a part with a straight knurling on one end and a depressed diamond knurling on the other end. A careful study of the part shows that both knurlings are performed on the stock diameter. Some drawings omit this information with the result that the tool design engineer is puzzled as to whether to add a turning operation before knurling, or to knurl on the stock diameter. A turning operation would be necessary, of course, if the diameter of the knurling after the operation had been performed was limited to the size of the stock diameter or less.

A high speed machine is preferable for this operation because the material is free machining brass, which should be processed at the fastest spindle speed available. A particular type of machine well suited for making this part, is the B & S Turret Forming machine. This machine is equipped with a six hole turret and a non-reversible spindle.

Screw machines of this type are designed primarily for use when making parts such as shown in Fig. 31, which do not require any threading or tapping operations.

A chuck sketch shown in Fig. 31 suggests a practicable means for developing the sequence of operations required. This sequence enables the designer to decide whether the part should be fed out and then finished complete, or whether it would be more advantageous to feed out part way, knurl from the turret, then feed out a second time, followed by the remainder of the cutting operations such as the knurling, chamfering and cutting off.

It is always desirable to work as close to the chuck as possible. Therefore, where the part is quite long and there is only one short dimensioned turret operation at the front end of the part, as in the case indicated, it is desirable to feed out twice as described above.

The sequence of operations is now

specified, which insures that the part will be made in the least possible number of seconds. As stated previously, the stock will be fed out a short distance followed by the turret-knurling operation. Then the stock will be fed out a second time. A side knurl holder mounted on the front cross slide will then advance and produce the depressed diamond knurling on the cutoff end of the part. This will be followed by the cutting-off operation.

The cutting-off tool will be provided with an aftercut to chamfer the front end of the next piece so that the turret knurling tool will be enabled to engage the work more readily. Assuming that a vertical slide attachment is mounted on the machine, a blade in this attachment will be utilized to chamfer the cutoff end of the part as shown in the chuck sketch Fig. 31.

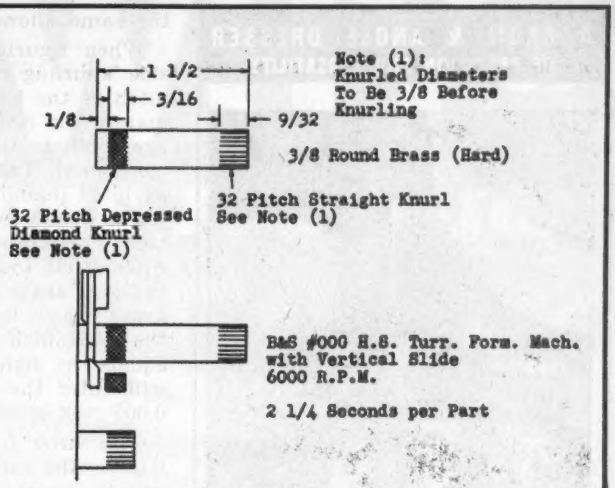


Fig. 31

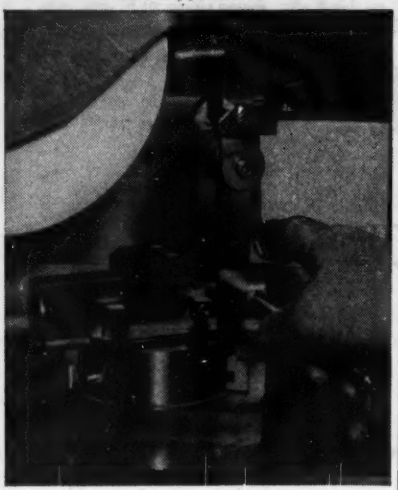
Order of Operations	Throw	Feed	Revs.
Feed to Stop			30
I. T.			30
Knurl On	0.291	0.020	15
Knurl Off	0.291	0.040	8
I. T.			30
Feed to Stop			30
Cut Off dw.	0.232	0.0035	70
			213 (A)
Operations Overlapped			
Knurl dw. Front Slide	0.021	0.003	11
Chamfer dw. Vertical Slide	0.015	0.002	12

(A) Refer to page 299 of the B & S Treatise. In the 6000 r.p.m. column, the nearest number of revolutions to 213 is 225. Under the column "Time in seconds to make one part," 24 seconds is shown.

In considering the operations that can be overlapped, it is quite apparent that the side knurling operation from the front cross slide can be performed immediately after the stock is fed out the second time. Stated another way, the part will be knurled from the cross slide while being severed from the bar. This operation is shown in Fig. 31 under the heading "Operations Overlapped." The chamfering of the cut-off end of the part will also occur during the cutting-off operation.

Computation for the throw of the turret knurling operation may be determined by adding the $\frac{3}{16}$-inch dimension and 0.010 inch for approaching the work. When the turret knurl holder is withdrawn from the work,

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the same allowance will be required.

When figuring the throw for the side knurling operation, the circular pitch of the knurl, which is approximately the distance from the top of one tooth to the next one, should be considered. The circular pitch of the 32 pitch diamond knurl used on this job is found by dividing 32 into one inch. Therefore the circular pitch will equal 0.031 inch. Assuming that the included angle of the knurl is 90 degrees, which is customary, we divide the 0.031 inch by two. This amount equals the distance the cutting knurl will enter the work. To this figure 0.005 inch is added for approach.

The throw for cutting off the part will be the sum of 0.005 inch to approach the stock diameter, plus half the diameter of stock, plus the depth of the angle on the cutting off tool, and 0.005 inch for the heel of the tool to pass the center of the spindle.

The feeds for the various cutting operations should next be selected. The Brown and Sharpe Screw Machine Treatise on Page 248 recommends a feed of 0.020 inch per revolution for knurling brass with a turret knurl, with a feed of 0.040 inch for the return travel. When using a side knurl holder on brass rod, it will be noticed that two feeds are shown in the Treatise and it becomes a matter of judgment to decide which of these two feeds should be chosen. If the width of knurling is considerable, the slower feed will be used, while a narrow width of knurling will permit the faster feed to be selected. The feed per revolution for cutting off brass rod is shown as 0.0035 inch.

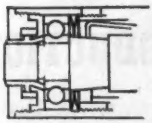
The dimensions for the feeds should now be divided into those for the throws to obtain the number of cutting revolutions. Whenever it is necessary for a tool to dwell for a few revolutions after the completion of its cutting operation, a few extra should be allowed. For this part, a dwell will

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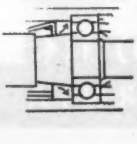


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be provided at the end of the side knurling, chamfering and cutting off operations. When a side knurl holder is used it is always essential to dwell for a few revolutions after the knurl has finished its advance, to "clean up the cut."

The time interval required to index the turret and feed out the stock should now be determined. This may be done by referring to the chart for the B & S No. 00G high speed automatic Turret Forming Machine, shown on page 299 of the Treatise. A spindle speed of 6000 r.p.m. will be used for this job, and below this figure 25 revolutions are indicated as the equivalent interval required to feed the stock and index the turret. Five extra revolutions should be added to facilitate setting up the machine.

A total of the revolutions for the seven steps in the order of operations amounts to 213. Again referring to page 299 of the Treatise, under the 6000 r.p.m. spindle speed, it will be noted that 225 revolutions is the nearest total listed. Under the column "Time in seconds to make one piece" 2¼ seconds are shown.

The throw for the vertical slide cam which actuates the chamfering of the cut off end of the part will equal 0.005 inch to approach the work plus 0.010 for cutting into the work. However, it might be noted that 0.005 of this amount has been removed by the cutoff tool.

The list of tools required to make this part includes the adjustable knurl holder, which is used for producing the straight knurling. This tool will be equipped with two straight knurls which are set with the teeth parallel with the spindle. The depressed diamond knurling will require the use of a side knurl holder with a raised diamond cutting knurl to produce the depressed diamond knurling on the



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HEEL or Secondary Clearance—For accurate and free cutting action, it is important to maintain the Heel or Secondary Clearance at the 29-degree angle indicated. This provides proper chip clearance (eliminates clogging) in the flute—reduces the material to be removed when grinding Land or Primary Clearance.

For best results use a soft, medium grade emery wheel—48 to 60 grain. Free hand grinding is not recommended. When excessive sharpening is necessary, keep the cutter cool.

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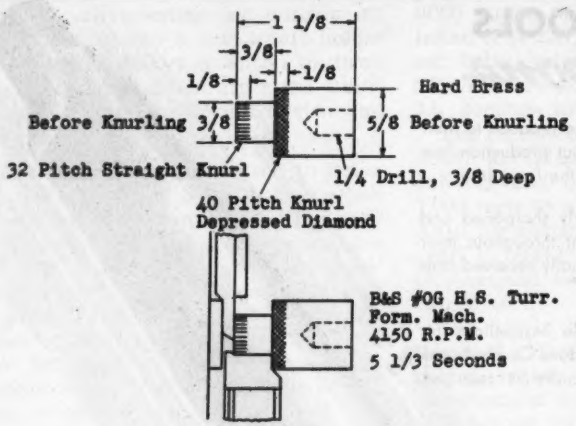


Fig. 32

Order of Operations	Throw	Feed	Revs.	100ths
Feed to Turret Stop			28	
I. T.			28	
Cent. dw.	0.090	0.006	19	
I. T.			28	
Drill dw.	0.385	0.012	36	
I. T.			28	
Bring Swing Tool into Pos.				4
Knurl dw.	0.018	0.003	10	
Clear				4
Knurl, Top Knurl Holder on Back Slide	0.250	0.005	50	
Rise up on Cam				2
Cut Off dw.	0.374	0.0035	111	
			338	
Operations Overlapped				
Form dw. Front Slide	0.146	0.0015	102	

part. As mentioned previously, a cut-off tool with an aftercut will be used. The blade in the vertical slide will be ground as shown in the chuck sketch Fig. 31.

Figure 32 shows a part which requires considerable analysis to decide what method of manufacture can best be used, when the only machine available is a Brown and Sharpe type automatic screw machine which is not equipped with a vertical slide.

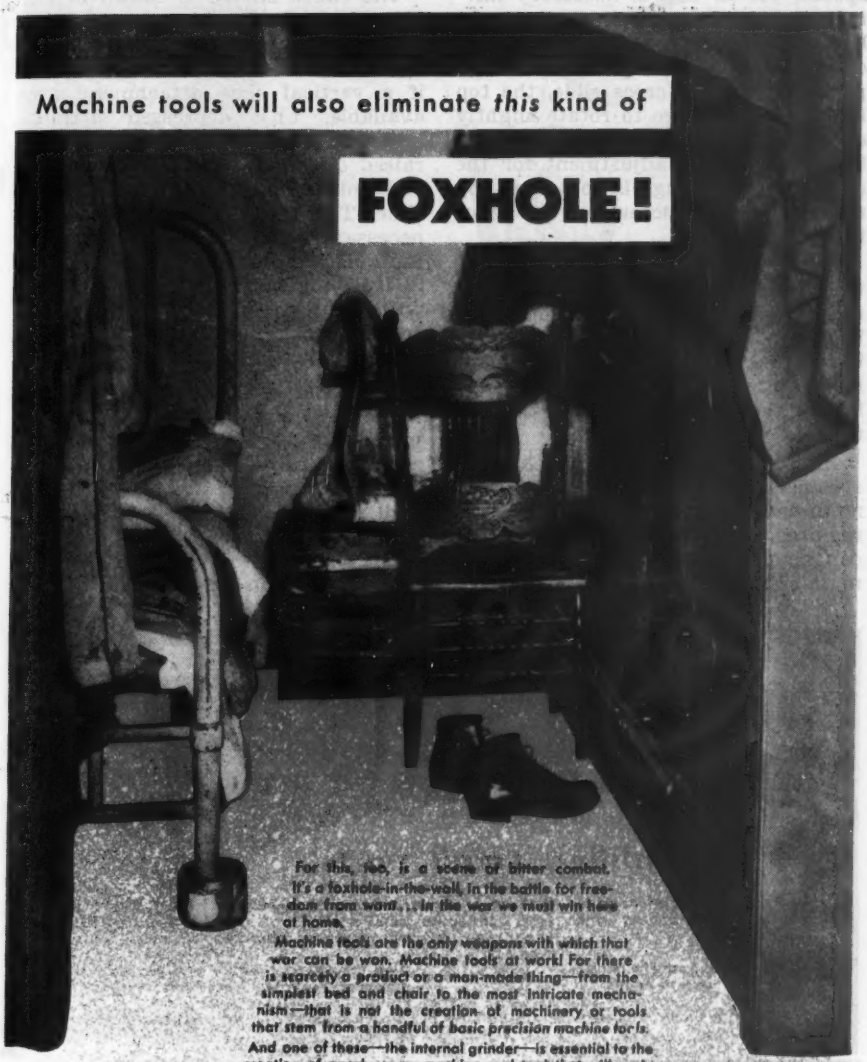
Following are the steps in the planning of this part. It is apparent that the diamond knurl could not be produced with a turret knurling tool, but could readily be made with the side knurl holder if one of the cross slides could be used. However, the ⅜-inch diameter will be produced with a circular tool mounted on the front cross slide, and the part will be cut off from the back cross slide; therefore, a knurling swing tool will be required to produce the diamond knurling. Incidentally, the diamond knurling on the piece part is the depressed type; therefore a raised cutting knurl is used in the swing tool.

The straight knurl shown on the ⅜-inch diameter could also be produced with a side knurl holder if one of the cross slides were available. A second swing knurling tool might also be used, but this procedure would require considerable cam surface to bring the swing tool into the cutting position. There is another general use type of knurl holder which can be used to better advantage on this job; the standard B & S top knurling holder. This tool is designed to produce a knurl on the cut-off end of the part.

When a top knurl holder is used, a

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special cut-off tool is necessary having a turned diameter to fit the large hole in the knurl holder. When the circular tool is clamped to the tool post on the back cross slide, the top knurl holder is free to rotate slightly on the turned diameter of the cut-off tool. The proper adjustment for the depth of knurling is obtained by means of the setscrew on the knurl holder.

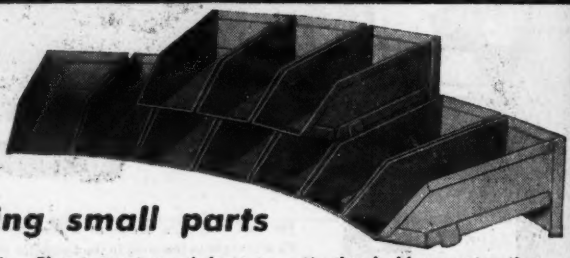
As discussed in the previous article, where the stock is fed to a stop which is held in the turret, the top knurl holder should be used. When the stock is fed to a swing stop, the top knurl holder interferes with it; therefore a bottom knurl holder should then be used.

A high speed screw machine is specified for this brass part, and since no threading or tapping operations are required, a turret forming machine can be used, operating at the maximum spindle speed available.

The chuck sketch is shown in Fig. 32 with the form tool and cut-off tool in their respective positions. It should be mentioned at this time that if a vertical slide attachment were available, the depressed diamond knurling could be produced with a raised diamond knurl, held in a special holder and used in the vertical slide. This method would make it unnecessary to use the knurling swing tool. However, many Brown and Sharpe machines are not equipped with vertical slides and for this reason the problem is presented as shown in the chuck sketch.

The order of operations required to make this part should now be determined. Figure 32 shows a preferred and practical sequence of operations. The cutting operations are: center, drill, form, produce the diamond knurling with the swing knurl tool, knurl using a top knurl holder, and cut off the finished part.

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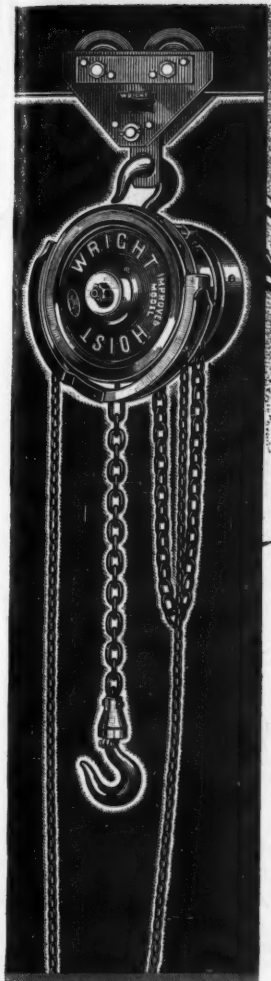
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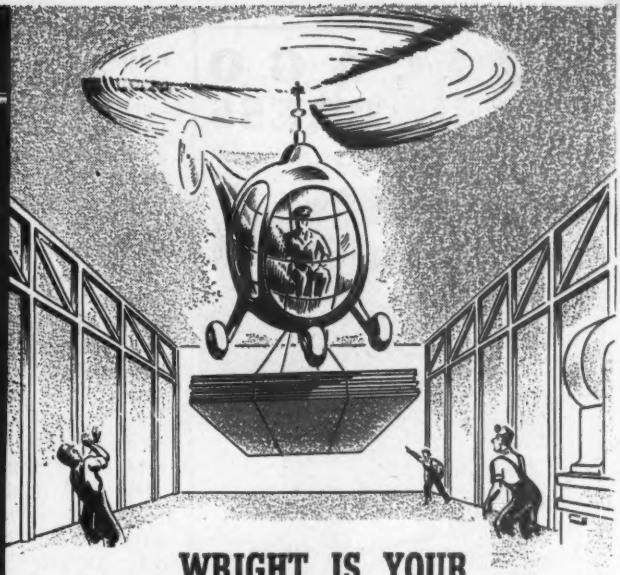
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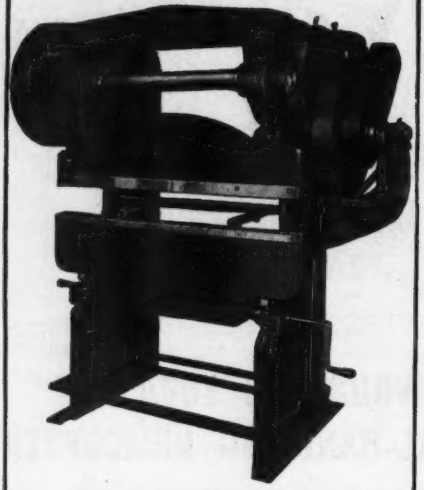
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Two important factors to be considered in deciding the order of operations are the clearances that will be required and the possibility of overlapping some of the cross slide tools with the turret operations. Clearance time, for instance, will be required while the swing tool is being brought into cutting position. Clearance time should also be allowed between the knurling swing tool and the top knurling operation. This clearance time is necessary to allow the swing tool to drop back before the top knurl holder, mounted on the back cross slide, comes into cutting position. The point of interference would occur between the back portion of the swing tool body and the clamping bolt on the cross slide tool post.

The item "Rise up on cam" which precedes the cutting off operation in Fig. 32 provides for a quick rise on the back cross slide cam to bring the cut-off tool into contact with the stock when the top knurl has reached the center of the spindle; in other words, when the knurling has been completed.

In considering the operations that can be overlapped, it can be seen by referring to Fig. 32 that the forming of the ⅜-inch diameter will take place while the centering and drilling operations are being performed, because the number of cutting revolutions required for the forming operation is less than the revolutions obtained from the centering and drilling operations.

The top knurling operation cannot take place until the forming has been completed. It has already been mentioned that the operation of cutting off the part does not begin until the top knurling operation is finished; therefore the overlapping of the cross slide and turret slide tools will be confined to the forming operation taking place during the centering and drilling operations.

The throw for the centering opera-









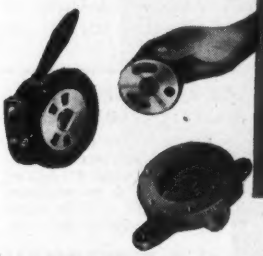
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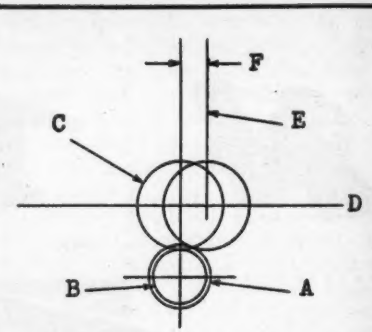
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tion will equal 0.010 inch for each 1/32 inch of hole diameter, or 0.080 inch plus 0.010 inch for approaching the work. The depth of the drilled hole is 0.375 inch with 0.010 inch added to approach the work. The throw for the diamond knurling operation is obtained by first determining the circular pitch of the knurl, which is found by dividing the pitch into one inch. For a 40-pitch knurl this would equal 0.025 inch and the answer is divided by 2. To the figure obtained, 0.005 inch is added for approaching the work.



Draw knurled diameter of part A. Draw root diameter of knurling B. On vertical center line, draw cutting knurl C tangent to root diameter of knurling. Draw center line D. On line D draw circle C tangent to A. Draw center line E. Measure distance F. Add approximately $\frac{1}{64}$ inch for approach.

Fig. 33—Plan for Figuring Throw Required for Knurling Holder

The throw required to enable the top knurling holder to perform its operation can be determined by making the layout shown in Fig. 33. The feeds per revolution are those shown in the Brown and Sharpe Treatise, which are divided into the number of throws to obtain the number of cutting revolutions. The revolutions required for indexing the turret and



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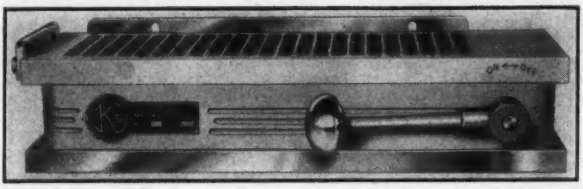
feeding the stock are found on page 304 of the B & S Treatise under the spindle speed column of 4150 r.p.m. To the 23 revolutions shown, five are added to facilitate setting up the machine.

Referring again to Fig. 32, the time required for the various clearances can now be determined. The number of hundredths of cam surface required to bring the swing tool into cutting position after indexing the turret will be approximately four, and this figure can be used for estimating purposes. Further clearance time will be required to "rise up" on the cut-off cam from the moment when the knurl in the top knurl holder passes the center line of the spindle until the cut-off tool comes in contact with the work and starts the cutting-off operation. From experience it has been found that 2/100 of cam surface is a sufficient amount to be allowed.

To determine the actual number of hundredths of cam surface required for the clearance between the knurling swing tool and the top knurl holder it is necessary to prepare a diagram similar to that included in the method shown in the B & S Treatise on page 160. However, for estimating purposes, an approximate clearance time of 4/100 of cam surface should be ample.

The number of revolutions should now be totalled, also the hundredths for the clearances. The total of 338 revolutions equals 100 hundredths minus the 10 hundredths obtained from the right hand column in Fig. 32. Therefore, the 338 revolutions equal 90 hundredths. To find the number of revolutions in 100 hundredths, the totalled revolutions are multiplied by 100 and then divided by 90. The answer is: 376 revolutions in 100 hundredths of the cam surface. Referring to page 304 of the Brown and Sharpe Treatise; the nearest number

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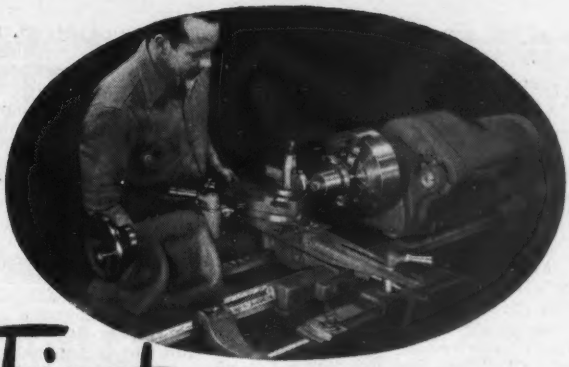


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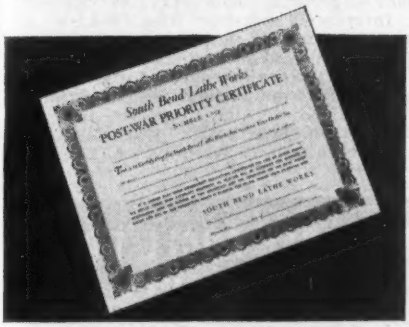
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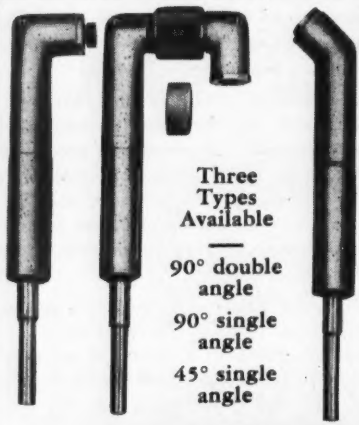
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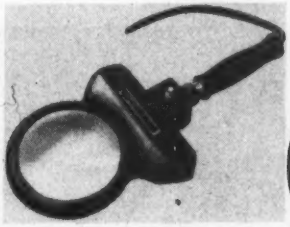
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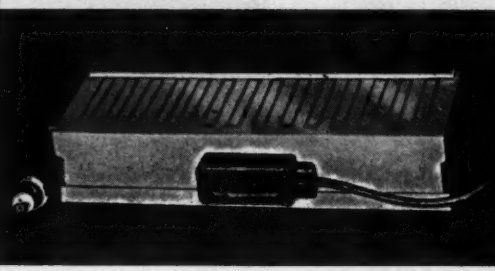
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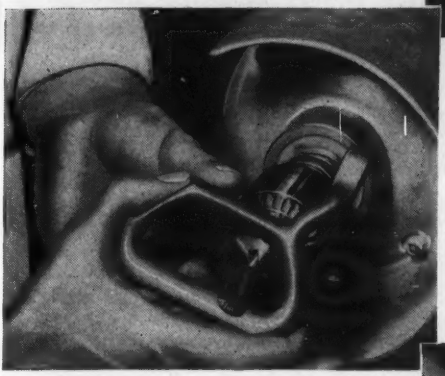
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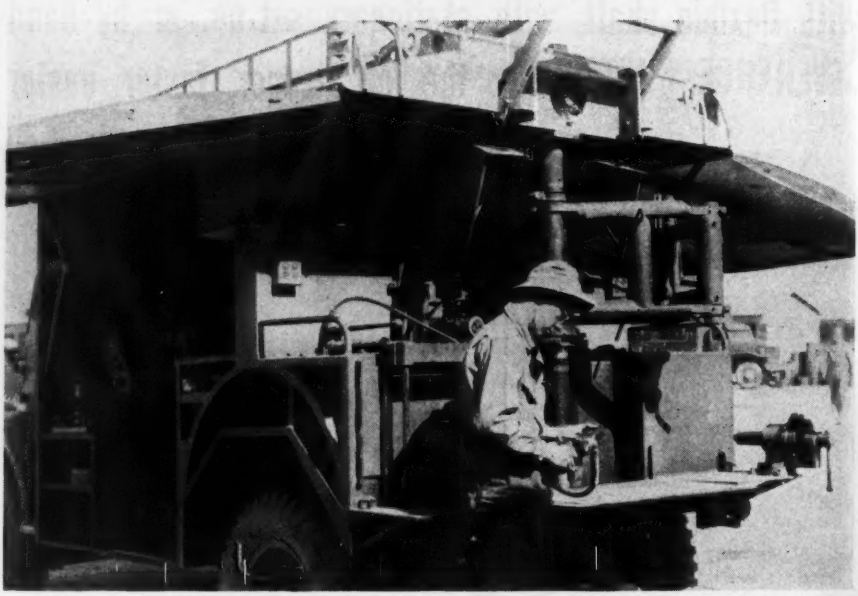
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By ROBERT CLARK

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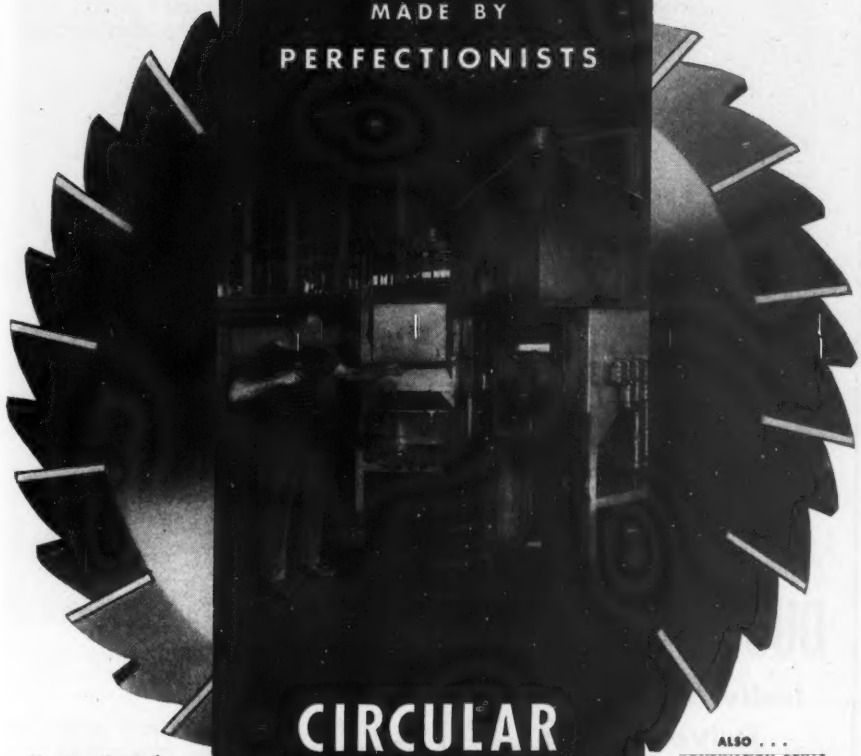
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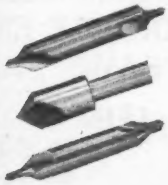
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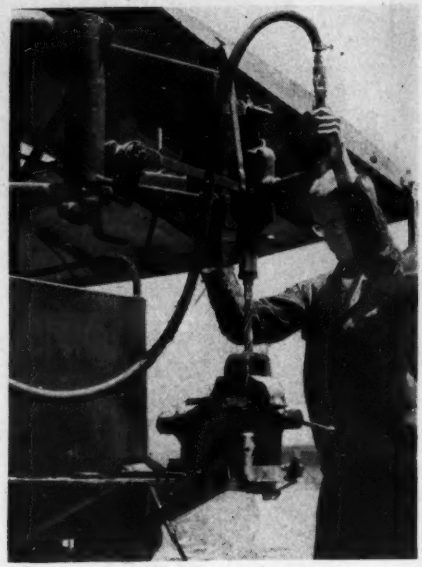
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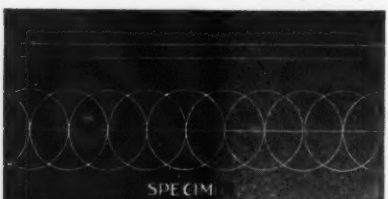
tor truck, the engine of which not only gives power to the wheels while traveling, but once set up at its destination can be cut-in to drive either an alternating current or a direct current generator. However, if city power is available, the "AC" generator can be used as a motor to drive the "DC" machine.

The alternating current which comes from the AC generator when it is driven by the gasoline engine can be distributed three ways: as 220-volts, three-phase; as 110-volts, single-phase for lighting purposes; or 110-volts, three-phase for charging batteries.

By contrast the output of the DC machine, whether driven by electric motor or gasoline engine, is used to run many types of equipment and for electric welding — a most important feature of airplane maintenance.

In addition to the electric generators, the "A" unit carries a Rogers press which, if used for stationary work, can exert a pressure up to 100 tons. It can take the caterpillar track from the airfield's bulldozer and press pins out of it as easily as a child can press pins into a pincushion.

Other tools carried by this truck



DYKEM STEEL BLUE

Stops Losses in Making Dies and Templates

Simply brush on, right at the bench; ready for the layout in a few minutes. The dark blue background makes the scribed lines show up in sharp relief, and at the same time prevents metal glare. Increases efficiency and accuracy.

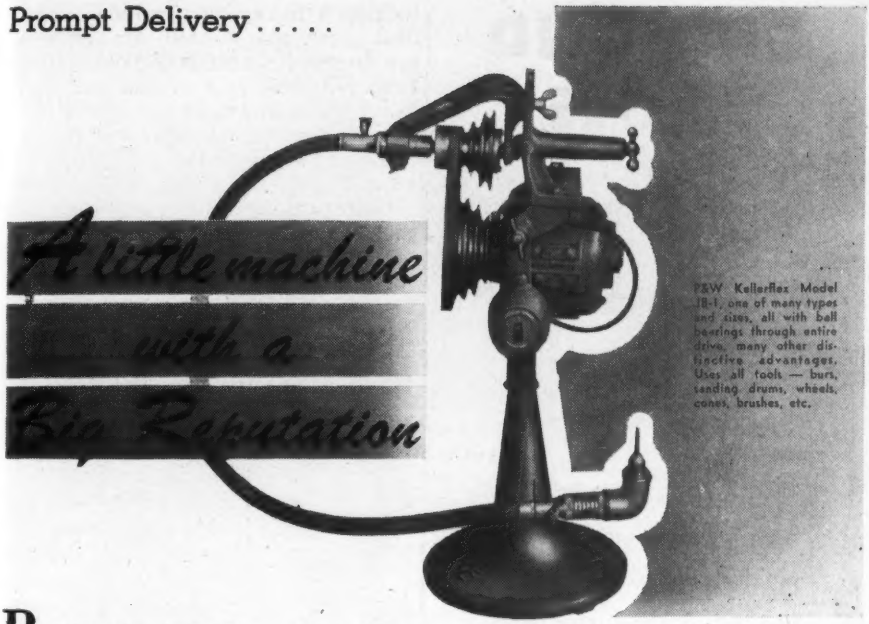
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Prompt Delivery . . . . .



P&W Kellerflex Model JB-1, one of many types and sizes, all with ball bearings through entire drive, many other distinctive advantages. Uses all tools — burs, sanding drums, wheels, cones, brushes, etc.

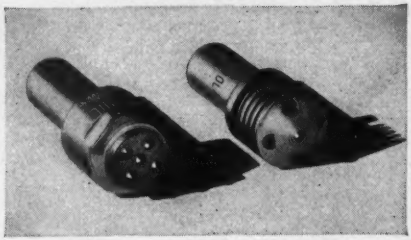
BY COMPARISON with other Pratt & Whitney machines, the P&W Kellerflex is little . . . but it's doing some mighty big jobs, and has earned a big reputation.

Kellerflex has the same top qualities you'd expect of equipment built by the makers of such super-accurate machine tools as P&W Jig Borers, Gear Grinders, and the rest. It's a flexible shaft machine — with a difference: *stamina, strength, extra* ease of handling. Built in many sizes and types, with a full line of accessories, Kellerflex handles countless tough jobs — buffing, burring, drilling, grinding, die finishing, polishing, lapping, sanding, snagging, wire brushing, and many others.

Of course you want to use flexible shaft equipment to speed production, save manpower, improve quality. When you buy, choose *Kellerflex* for *long, dependable* service . . . then you'll be equipped for a flying start at your post-war production. Write for details. Thanks to increased facilities we offer PROMPT DELIVERY to priority-holders. PRATT & WHITNEY, *Division* Niles-Bement-Pond Company, West Hartford, Conn.

KELLERFLEX

DIAMOND TOOLS



SMITITE STA-KOOL

The STA-KOOL Single-Point Tool is equipped with internal coolant ducts and external cooling fins to quickly dissipate the heat generated in the nib, thus prolonging tool life.

SMITITE Diamond Tools employ a sintered metal setting which firmly holds the stones till they are completely consumed, without resetting.

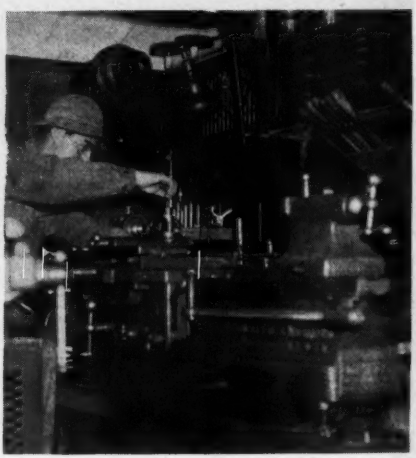
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J. K. SMIT & SONS

157 Chambers St., New York, N. Y. 6400 Tireman Ave., Detroit

include a heavy duty grinder and a drill press, also a small air compressor to inflate automobile and truck tires. On the roof of the unit is a heavy boom and hoist capable of lifting 10 tons—most desirable in wet climates where light equipment is often hopelessly mired in the mud.

However, the primary purpose of this A unit is to furnish power to the "B" unit truck—the portable machine shop which does most of the actual



The Bench Lathe is Light Enough for Fine Work but Heavy Enough to Handle Practically Any Job that May Be Required of It

maintenance work on planes, motors and equipment at the far-away airfield.

The Couse Laboratories at Newark, N. J., who developed the unit, spared no effort to produce in as compact a space as possible all the essential equipment for doing precision machine shop work. Whether it be routine maintenance or emergency repair to airplane motors or even to delicate instruments, it's all in the day's work for the men assigned to this unit.

The motive power for driving this heavy truck to its base of operations is a Ford V-8, 100-horsepower motor



The Diamond Grip Stops the Slip

HOW TO GET MORE WORK *from your* OLD MACHINES

Get a Sutton Master Collet and a Master Feeder for each automatic. We'll recommend an assortment of interchangeable, replaceable pads that will handle all your work—round, hex or square—up to machine capacity.

Sutton full-floating Collets eliminate trouble with hot-rolled stock. Sutton patented Diamond Grip Collets cost no more than ordinary collets, but enable you to speed up machine cycles to the capacity of the tools. Sutton Draw-bars and Adaptors enable your old lathes to handle full length bar stock.

SUTTON TOOL COMPANY

2895 W. GRAND BLVD., DETROIT, MICHIGAN

See our representative or send for Catalog 15.



SUTTON Diamond Grip **COLLETS**

mounted on a special reinforced chassis. In contrast to the A unit, this V-8 only provides motive power for the truck and does no electrical generating.

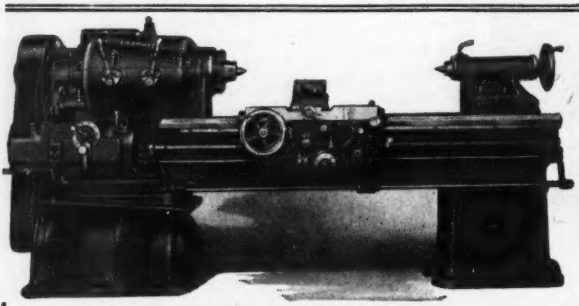
The powerplant for furnishing "juice" and also for running a heavy duty air compressor is a Mercury V-8, 95-horsepower gasoline motor. This is located in the back of the truck just above the rear axle. By the use of an ingenious device the power of this motor can be used to drive either the air compressor which, operating alone, develops 60 cubic feet of air per minute at 90-pounds pressure; or to run a 3-KW, 110-volt, 60-cycle, three-phase A.C. generator. Or if need be, the load may be divided between the compressor and the generator.

One of the interesting features of the B unit is that much of its equipment is air-operated. For instance, a large radial drill, a 10-ton pump, a portable air-drill, a sturdy chipping hammer and a 10-ton ram are all operated from the air compressor. The large air storage tank for this is a structural part of the unit and is located lengthwise of the truck just under the roof.

What could be classified purely as machine shop equipment are a precision lathe having a 20-inch swing on a 6-foot bed, a drill press of ⅝-inch capacity, a valve refacer and a valve regrinder. These machines are all motor-operated.

In addition to the above there is a compact, but serviceable battery charger, a buffing machine, and a small circular saw for light work. The lathe can be converted to do light milling, such as cutting key-ways, grinding and gashing small gears.

Like the A unit, the B is very flexi-



Engine Lathes

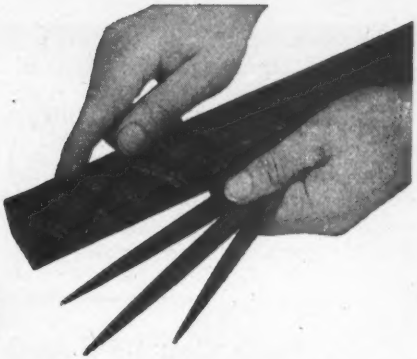
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ble in operation. It, too, can use any outside source of power if it's available. Transformers beneath the floorboards can handle incoming voltages from 440- to 220-volts.

Yes, the old circus powerplant has gone to war, and with it the colorful surroundings of the sawdust trail. For it's got a more important job to do these days and it's doing it. Out there on distant battlefronts it's humming away, carefully watched over and tended by the skilled personnel of the Aviation Engineers: those machinists, mill hands, welders and electricians who are ready to go into action on a moment's notice to keep our Air Force masters of the skys.

Tools Can Be Saved

By Cooperating with the Tool Hardener

From A. S. EVES

Chief Field Engineer, Perfection Tool and Metal Heat Treating Company, Chicago, Ill.

OF course you are interested, as all of us are, in the Government's campaign to conserve cutting tools. But did it ever occur to you that very few such tools —perhaps only 25 per cent—born in the toolrooms of this broad land ever reach the job and there achieve the maximum results?

I have read many splendid articles in trade magazines telling how to design, grind, and use tools to best advantage, but have searched in vain for any mention of the time and material wasted because of the ever-widening gap and the lack of cooperation between the men who actually make these tools and the chaps whose responsibility it is to harden them so that they will give most uniform and satisfactory production.

Maybe the thing I have in mind has been deemed too obvious to talk about. Moreover, I can understand how a toolmaker, seeing only an occasional mishap resulting from this lack of getting together with the heat treater, would think it insignificant.

The opportunity to save man-hours and conserve scarce material is much clearer to us here in a modern commercial heat treating plant because we stand in the middle of a stream of different jobs. Hundreds of such jobs are given to us to treat each day. They range from a simple die and punch to as many as 40,000 or 50,000 pieces or more of some vital war part. They involve practically every recognized brand of steel, in many shapes and sizes, calling for a wide variety of treatments and specifications. From such a viewpoint



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Combination Gate and Barrier Guards
Two-Hand Safety Starting Devices
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. . . and then the "TOMAHAWKS" came a-flying

YOU'VE READ many stories about how the Tomahawks licked the ME-110s, the Focke-Wulff 190s and Tojo's Zeros. But the chances are you've never heard how **"TOMAHAWKS"** helped to win one of the war's biggest battles.

These Tomahawks were not the Curtiss fighter planes known to every schoolboy of the United Nations, but Genesee **"TOMAHAWK"** cutting tools which—on the production front—have helped to win our first big battle, the battle of production.

These Tomahawks have come a-flying by the thousands and tens of thousands out of Genesee's three plants in Michigan's little town of Fenton. They tackle the toughest babies in the way of steels and bronzes and aluminum. Their pilots have not always been experienced—but these **"TOMAHAWKS"** like their flying namesakes have kept on and are keeping on cutting away, day after day and week after week—as part and parcel of the greatest production offensive success the world has ever known.

There is another battle Genesee has been helping to fight: The War on Waste. Its poster series—free to metal working plants in war industry—has been teaching workers the importance of conserving the vital materials used in cutting tools.

FOR VICTORY BUY UNITED STATES WAR BONDS AND STAMPS

GENESEE TOOL COMPANY

FENTON, MICHIGAN

* Registered U.S. Trade Mark

NO SKID SLIP SLIDE



MORTON

Enlarged view of perforated raised button with sharp gripping edges.

STEEL Safety RAMP

It's a "MUST"!

The die formed, perforated, upset buttons that "grip men's soles", prevent slipping because they do not wear smooth and will not retain oil, water or other liquids. Morton Steel Safety Tread Ramps are furnished in flat pieces or with turned down edges for all types of supporting structures. Ramp plates, portable or stationary, are also used to bridge pits, holes, etc.

HEAVY MACHINERY MANUFACTURERS—Use Morton Safety Treads for ladders, stairs, platforms, and catwalks on the equipment you build.

Free Sample—to machine shop executives or supervisors.

MORTON MFG. CO., 5119 W. Lake St., Chicago, Ill.

MORTON STEEL Safety TREADS

one quickly sees some little-mentioned reasons for delays and failures.

We have no quarrel with the way most tools are designed, except that perhaps more thought could be given to the simple truth that a heavy steel section always is bound to heat and cool more slowly than a light section; therefore the latter expands and contracts faster and is more likely to distort or pull away. Some good toolmakers meet such conditions ideally by the use of fillets, or holes opposite sharp corners, or by deciding to make certain tools in sections rather than in a single piece.

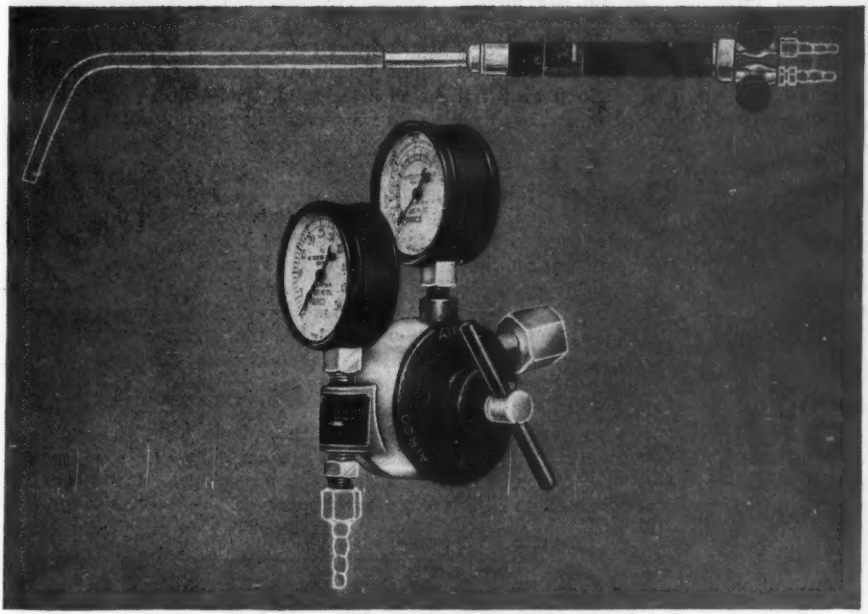
We do have some reason to holler when we are handed something to carburize and find it was made from a high carbon steel, or when we are asked to harden delicate dies made from water hardening tool steel when oil hardening steels are available, or when we are expected to produce springs out of parts stamped from cold rolled strip. Such things are far too common but they do not constitute, by any means, the principal source of waste.

The point I wish to make here is that the heat treater, in order to do a decent job, must know the kind of steel he is to treat. Not that every hardening job demands a written analysis of the steel. Not at all. Given merely the make and brand, or an indicating number, or assurance that it is a low carbon steel, the hardener will know the rest and can plan the treatment accordingly.

You wouldn't expect a doctor to prescribe for you without giving him some idea of your symptoms. Yet what actually is happening is that in far too many plants, between the time a piece of steel is cut off the bar in the storeroom and the time when machining is finished, all track is lost as to the kind of steel it is.

Hundreds of jobs come to us with no information at all as to the kind of steel used. Nothing on the shipping ticket; nothing on the purchase order; nothing stamped on the tools. Not even the phrase "same as last"—which, by the

A CHANGE IN *Appearance*



. . . BUT *None in Performance*

To conserve copper, copper base alloys and stainless steel, some component parts of Airco torches and regulators are now made of less critical materials. The dark areas in the above illustration indicate the parts affected by this change. All these parts are treated with a special coating for maximum protection against corrosion.

In all other respects, Airco torches and regulators are unchanged.

The parts shown in white outline above will no longer be furnished automatically with torches or regulators. This also is done for the purpose of conserving critical materials.

Purchasers desiring hose connections should therefore be sure to include them specifically when ordering torches or regulators. The same should be done with tips when ordering torches—in this case mentioning the size or sizes of the tips required for current operations.

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General Offices: 60 EAST 42nd STREET, NEW YORK 17, N. Y.

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way, we never dare to accept in good faith.

Everyone of these jobs is stopped in its tracks until we can get, by phone, mail, or telegraph, the data we need. Frequently we find that the customer himself doesn't know. The total of lost time is enormous, and while it may not appear serious, one must remember that such delays may be paid for in human blood in Italy or Attu.

By the way, there is one exception to this "stop" rule I just mentioned. If anyone is careless enough to send a heat treater tools or parts for carburizing, they will be so treated without any question. Only, later, if they break and are found to be hard all through, the evidence is plain that they were too high in carbon. Still, no amount of argument will replace the lost time or material.

The hardener is "in the clear," of course, because he cannot be expected to tell by appearance, taste or smell what kind of steel it is. Even if he could take time to spark-test every piece before treating, we must point out that such tests are by no means reliable. Certain oil hardening steels, for example, throw a spark exactly like a water hardening steel. Far worse than any of the foregoing; we receive every day of our lives jobs where one kind of steel is specified and it turns out later—oh, so much later! —to be *something entirely different!*

Now stop and think a moment. Those tools and parts have been treated for whatever the tool producer *says* they were. The heats used may have been much too low and the tools are still soft—or they may have been burned to a crisp.

If too soft, we can not count ourselves too lucky, even though by annealing and rehardening over and over again at the customer's expense we finally hit on something that produces a hardness in the neighborhood of what is required. For—mark this carefully—tools so treated can never be expected to do as good a job as though they were hardened at the correct temperatures in the first place.

COLBORNE Speed Lathes



SPEED-UP FINAL OPERATIONS ON DIES, GEARS, SCREWS LONG RODS, SHAFTS

For economical polishing, lapping or finishing of gears, shafts, dies, gages, ball races, long rods, etc.

Built to meet the requirements of those desiring a heavily constructed, smooth running machine of highest quality.

Has one H.P. built in motor with variable speed control, using REEVES standard pulley and belt.

Smooth automatic brake acts instantly when switch is thrown.

Collets or chuck may be used.

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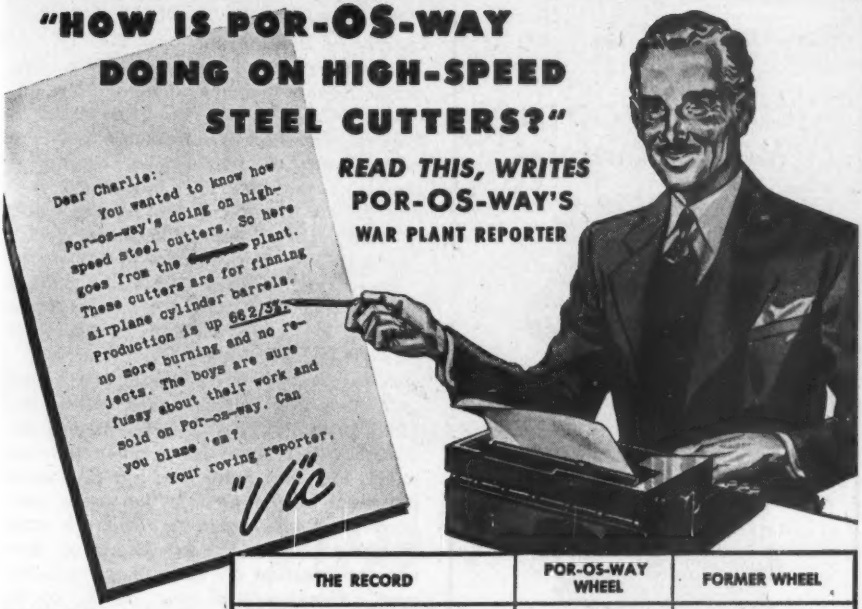
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"HOW IS POR-OS-WAY DOING ON HIGH-SPEED STEEL CUTTERS?"



READ THIS, WRITES POR-OS-WAY'S WAR PLANT REPORTER

THE JOB: Grinding sets of Huther high-speed steel cutters for finning airplane cylinder barrels on a universal tool and cutter grinder.

THE WHEEL: Por-os-way 7" x ½" x 1¼" 9A60HV2.

All facts and figures given are taken from an actual field survey.

THE RECORD	POR-OS-WAY WHEEL	FORMER WHEEL
Production per man per hour	5 sets (20 pcs.)	3 sets (12 pcs.)
Pieces per dressing	8 to 12	3
Wheel life	8 hours	6 hours
Stock to be removed	.010"—.018"	Same
Depth of cut per pass	.003"	.001"
Rejects	None	0.5 to 1%
Operations eliminated	Cutting shoulder	
Production Increase	66⅔%	
Remarks: Former wheel burned work. Por-os-way grinds cool, holds corner.		

WRITE, for complete booklet "Facts About Por-os-way". The address is 440 Wheatland Street, Phoenixville, Pa.

2 TO 5 TIMES MORE WAR PRODUCTION PER MAN PER MACHINE



POR-OS-WAY* a new RADIAC* PRODUCT

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Western Gateway to VALLEY FORGE

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Patent Applied For

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A Shearing Cut with "Chatterless Flowing Action"

Increased Production and Longer Cutting Life

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WOODRUFF KEYWAY CUTTERS

Write for Literature

ABER ENGINEERING WORKS INC.
Waterford, Wis.

In proof of which, may I add that no reputable hardener will guarantee the quality of a re-hardening job.

Just imagine what happens if we are handed one—or a thousand—tools which are supposed to be a certain kind of high speed steel. We subject them to more than 2,000 degrees of heat, and then find that the material was never intended to stand much more than half of that. They practically disintegrate. The loss is invariably complete.

There are thousands of steels on the market, and there are hundreds of treatments. For each steel and each job there is one best way.

Few folks seem to realize that even "regular" 18-4-1 high speed steels are made in about three or more varieties of carbon. Still fewer have given thought to the fact that there is a big difference between hardening for *hardness* and hardening for maximum *strength and toughness*. Incidentally; a lot of men are far oversold on the subject of hardness. Give such a man a tool at 59 Rockwell C, where it may work best for his job, and because a file will touch it he thinks he has been gypped.

But to get back on the track again. There isn't much difference in heats used to treat straight carbon steels, but when it comes to oil hardening steels, high carbon high chrome, and high speed—oh my! The heats may range anywhere from 1400 to 2400 deg. F. So it is of little use to merely indicate that a tool is made from "an oil hardening steel" as so many do.

The tool producer should become conscious of the fact that it is up to him to indicate fully and correctly the kind of steel and the use to which it is to be put. Errors, ignorance, and thoughtlessness cause no end of trouble and loss. One chap brought in a die worth several hundred dollars which, upon close inspection, was found to be made from four pieces welded together. We found one of these parts to be water hardening tool steel, another was machine steel, and two pieces were of high speed. That



Save those VITAL TOOLS

To appreciate how YOU will benefit from merely hand stoning your cutting tools between grinds, send for this pocket-size booklet with illustrations of actual industrial operations.

It recites authentic experiences of others who, by this simplest, most common-sense method, *have increased output from three to seven times without removing the tool from the machine.*

It brings home these facts:

Speed in the present crisis is essential;
Tools and tool steel are precious;
Sharp tools insure greater production speed;
Hand stoning produces sharper tools;
Keeps tools sharper for longer periods;
Increases time between grinds,
Reduces waste of metal and setting-up time.

Simply address BEHR-MANNING, TROY, N. Y., and tell us how many copies you will need.

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INDIA* (aluminum oxide), CRYSTOLON* (silicon carbide) and HARD ARKANSAS (novaculite) OILSTONES are available in dozens of shapes and grits to fit any type of tool.

* Reg. U. S. Pat. Off.

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gave us a laugh; we're still looking for someone who can harden that die. But we are sobered by the thought that here is indicated an attitude which is all too common and thoroughly bad.

In our plant, where we treat hundreds of jobs each day, from 10 to 15 per cent are given us without any indication as to the kind of steel, or worse yet, with information that is *wrong*.

We just treated three large dies where a certain brand of tool steel was indicated. All showed different hardnesses after the quench. When we spoke to the customer, he said, "Ridiculous, they were all cut from the same bar." We often hear that, of course, so we persisted, and he promised to call us later. In about two hours he was on the phone confessing that the material had not originated in his own plant at all, but had come in three pieces from an out-of-town firm.

I have talked a lot about our own plant. Forgive me. I want right now to point out that when the total production of tools in the entire country is considered, we are as a nit on a gnat's ear. But I am convinced that the conditions described are by no means peculiar to us here; they are duplicated every hour elsewhere.

The total lost time will, I believe, be found to exceed the greatest strike in history, and there is undoubtedly a daily waste of millions of dollars in material. Right now there are thousands of tools and parts, many of them expensive, lying in furnaces at wrong heats because someone gave incomplete or wrong information to the hardener.

This waste is to a great extent preventable. I believe so because some of our customers seldom err, while others are constant offenders. Some take great pains to see that we are thoroughly and reliably informed; others don't seem to give a hang so long as it is "a piece of steel."

If each of us will pay the same attention to this situation as we do to the



IN WAR OR PEACE

ACME
DRILL JIG
BUSHINGS
Are the guide to Precision Drilling



★ Here at Acme, we're busy day and night producing drill jig bushings and many other precision items . . . all labeled for "Uncle Sam." And we'll keep right on doing this job for our country until victory is ours and peace comes to the world.

Manufacturers of peacetime products that require accurately drilled holes, are urged to standardize on ACME BUSHINGS to assure the low cost production necessary to meet price competition in the post-war era.



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Think of your Industrial Distributor as a Supply Specialist. Take him into your planning at the start. Today and every day you'll find it pays to

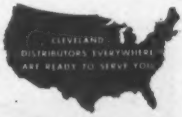
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designing, grinding, and use of tools, and will encourage others to do likwise, I believe we can double our present contribution to the nation in the way of man-hours saved and scarce metals conserved.

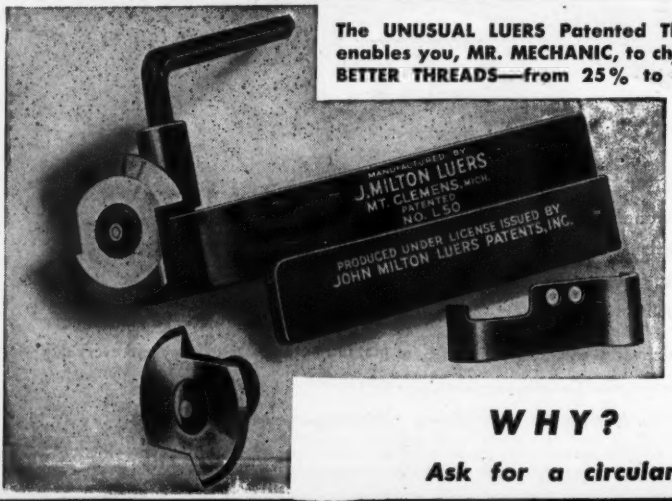
Safety Manual

Copies of a 52-page pocket-size Safety Manual containing advice and cautions based on the latest war-time as well as general experience with industrial hazards have recently been issued to all employees of the manufacturing Divisions of the Aviation Corporation, according to William F. Wise, executive vice president.

The Manual outlines the hazards involved in the use and operation of chemicals, machine tools and other machine shop equipment and tells what to do when an accident occurs. The discussion covers 49 subjects, including Acids and Chemicals, Air Hose, Belts, Boring Mills, Crane Signals, Drill Presses, Furnaces, Gear Cutters, Grinders, Hand Tools, Lathes, Milling Machines, Saws, Screw Machines, Turret Lathes, Welding, Artificial Respiration, Electric Shock, Goggles, Lifting, Respirators, and other subjects.

The text is emphasized by means of cartoons that point a moral in an effective manner. Copies are available upon request to Safety Directors and Plant Executives who may be interested in adopting the idea. Address requests to Hill & Knowlton, Guildhall Bldg., Cleveland 15, Ohio.

"Citco" Diamond Tipped Tools. Cleveland Industrial Tool Corp., 4713 Euclid Ave., Cleveland, Ohio, now has available an eight-page catalog illustrating and describing its line of "Citco" diamond tipped tools which includes boring tools, wheel dressers, crystal points, chisel form tools, facing tools, and others. Convenient tabular information regarding applications of the diamond and other hard minerals as working tools and grit sizes and application of diamond dust is provided on the back page of the catalog. Copy free upon request.



The UNUSUAL LUERS Patented Threading Tool enables you, MR. MECHANIC, to chase threads—BETTER THREADS—from 25% to 50% FASTER.

WHY?

Ask for a circular.

MANUFACTURED BY **J. MILTON LUERS**

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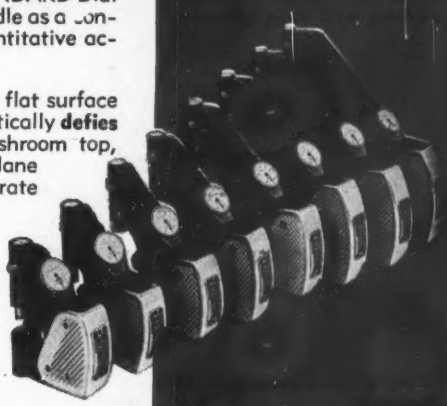
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HERE'S A GAGE that combines PORTABILITY with speed in use and absolute accuracy on dimensions as fine as .0001". STANDARD Dial Snap Gage is portable and easy to handle as a conventional snap gage, yet has the quantitative accuracy of a stationary instrument.

Adjustable gaging pin has a serrated flat surface tipped with tungsten carbide that practically **defies wear**. Opposite movable pin has mushroom top, also tungsten carbide. Point-and-plane construction assures continued, accurate readings whether instrument is set by cylindrical or flat standards.



STANDARD Dial Snap Gages speed inspection, guard against rejects and eliminate human variations not only on precision work but also where tolerances are comparatively liberal.

FEATURES

1. High precision indicator approximately 1" in diameter graduated .0001". Bezel rotates for convenient setting.

2. Measuring anvil tipped with tungsten carbide. Indicator protected against shock by sudden applications to measuring pin.

3. Tungsten carbide tipped adjustable anvil has flat lapped serrated surface. Chips and dust readily clear from it, helping insure accuracy.

4. Adjustable, spring-cushioned safety stop reduces jar, helps hold work in correct gaging position.

5. Air space under grip protects against hand heat.

ARMY E NAVY

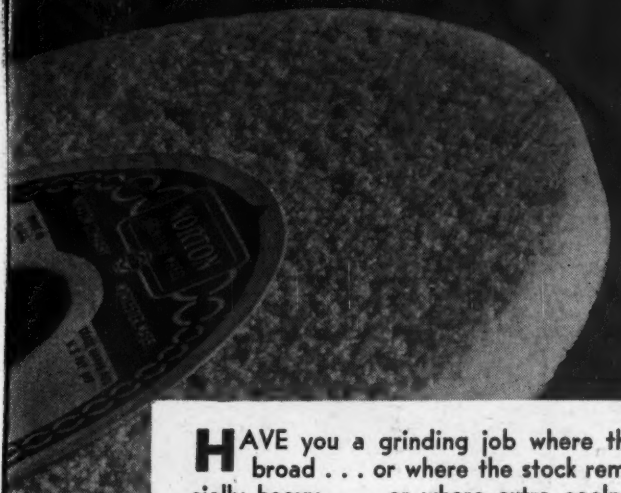
STANDARD GAGE CO., Inc., Poughkeepsie, N.Y.

On these Types of Jobs Y
with Norton OPEN STRUCTUR



NORTON ABRASIVES

Can BOOST PRODUCTION
rinding Wheels



HAVE you a grinding job where the contact is broad . . . or where the stock removal is especially heavy . . . or where extra coolness of cut is essential? It's on jobs like these that Norton OPEN STRUCTURE Grinding Wheels and Segments can speed war production—making possible heavier and faster cuts.

You will like, too, the uniformity of Norton open structure products. That is because the large pores are obtained by a special adaptation of the Norton Controlled Structure process of manufacture—a patented process which assures grinding wheels and segments that have the same grinding action every time.

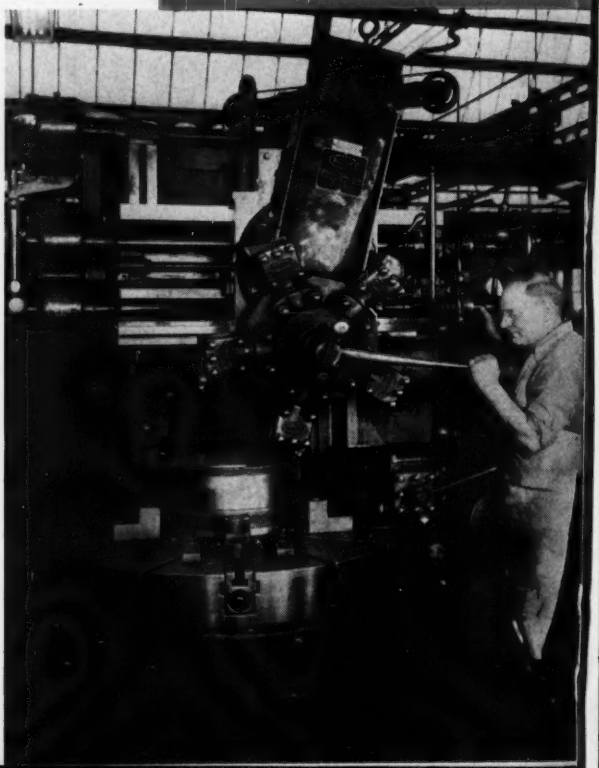
You may have many jobs for which Norton Open Structure Grinding Wheels are a "natural" — on which they can materially increase production. Let Norton abrasive engineers study your grinding jobs and specify the correct wheels for each.

NORTON COMPANY, WORCESTER 6, MASS.

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HERE'S THE RAPID WAY TO ROLL OUT THE BEARINGS

BULLARD



11 machining operations to a single chucking — with that kind of a set-up you're bound to get speed. In the machining of both interior and exterior of the large roller bearing cup shown here, the individual feeds for main and side heads, simultaneous operation of both heads, and indexing of one head with continued operation of the other, speed production.

For angular cutting the main head is easily swiveled to either right or left. Note the illustration.

Spiral Drive Vertical Turret Lathes are built in 24", 36", 42", and 54" table sizes. Also Cut Master Vertical Turret Lathes in 74" size with two or three heads.

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ROTO-CLONE

Dust Control

GRINDING BENCHES SPEED PRODUCTION

Shown on this page are some of the special AAF Roto-Clone grinding benches designed to meet specific needs in war production plants. Complete information on each will be sent on request.

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We are the largest exclusive manufacturers of gage handles in the country. Because of quantity production our prices are positively the lowest in the trade — yet our quality is unsurpassed by any maker of gage handles in the industry.

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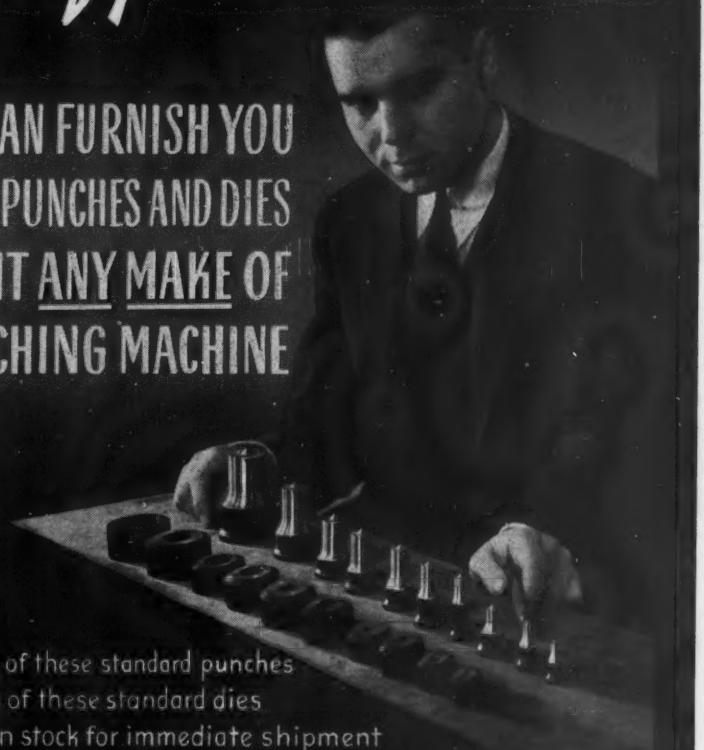
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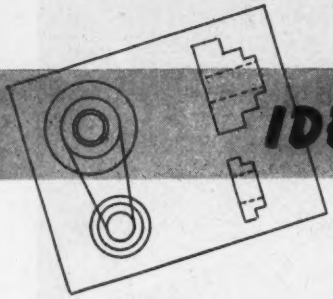
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241 sizes of these standard dies
carried in stock for immediate shipment
as shown on accompanying ready reference tag

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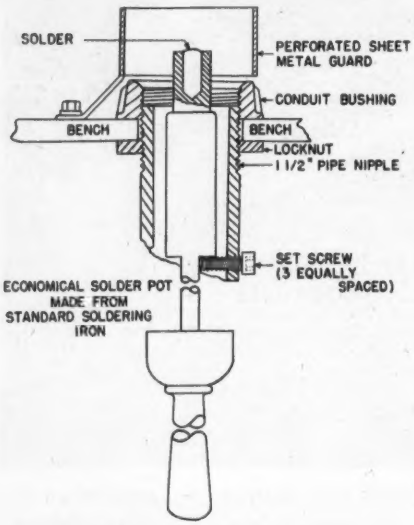


IDEAS FROM READERS

Electric Soldering Iron Makes Efficient Solder Pot

THE use of electric soldering irons especially adapted as solder pots has facilitated the production of small instrument-type motors in one of General Electric's Works. Because they present only a very small area for oxidation, the irons are saving materials.

The improvised solder pot, which was developed by R. H. Bainbridge—a foreman—is easily built. A standard medium-size soldering iron tip is faced off flat and drilled ¾-inch deep, in the center of the flat, with a ¼-inch drill. This tip is then reassembled to the soldering iron and the iron is mounted vertically in a hole in the bench so that the tip projects about two inches above the surface of the bench.



Drawing of Electric Soldering Iron Adapted for Use as a Solder Pot

The mounting is made permanent by the use of a standard pipe nipple locked from the top with an electrician's conduit bushing and from the bottom with an electrician's locknut. The iron is held in the bushing by three setscrews which clamp the body of the iron proper, as shown in the drawing.

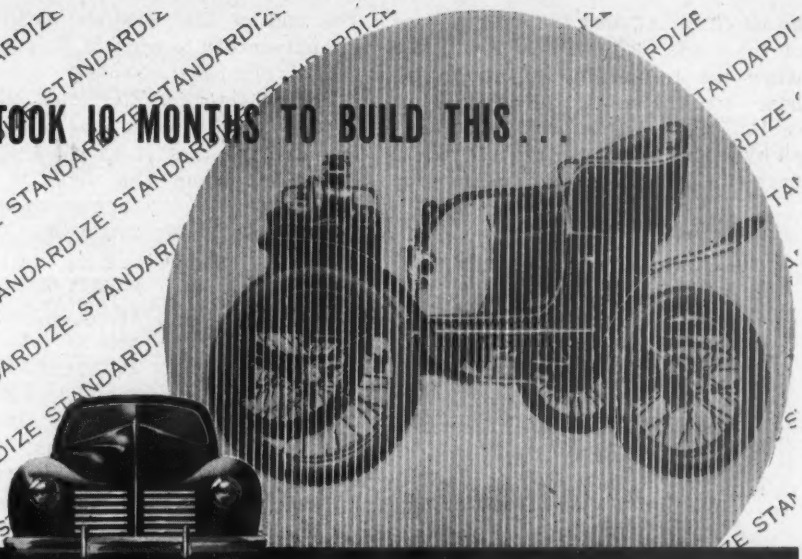
The only insulation required for efficient operation is that contained in the iron itself. A perforated sheet metal guard is placed about the tip so as to encircle it and at the same time permit free circulation of air, eliminating the possibility of overheating the solder while assuring safety by guarding against accidental contact with the heated tip.

Combination Spider-Arbor

By C. W. Kneff

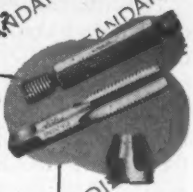
THE use of a spider, as it is generally used for mounting work in the lathe, is attended with difficulties. The screws in the spider must

IT TOOK 10 MONTHS TO BUILD THIS . . .



in 1 minute they roll out 4 of these

WHAT'S THE BIGGEST REASON FOR THE DIFFERENCE?



The Duryea Brothers' first "horseless carriage" was a triumph of individual ingenuity, but their original manufacturing methods would never have put America on wheels. Nor would they have enabled us to produce the volume of planes, tanks, and guns that are winning the war today.

Why is it that in 1941 one of the "big 3" automobile manufacturers could roll out 4000 cars a day, or one every 15 seconds . . . as compared to the months it took the Duryeas to build their car?

The answer in a word is: STANDARDIZATION.

The increased standardization of the last 30 years is the force that has brought hundreds of products of American industry to their present widespread use, and lowered costs.

A still greater standardization can bring many products to a still broader use, by an increasing number of people, in the years ahead.

Standard Threads-

SAVE TIME - SAVE MONEY!

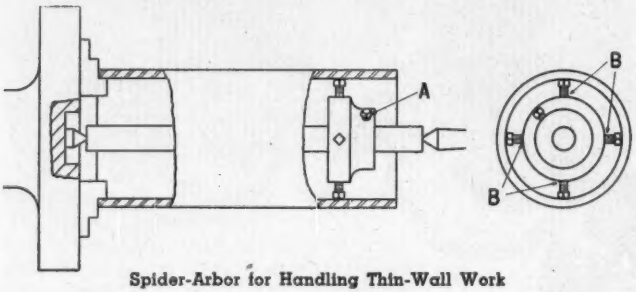
Full utilization of existing accepted sizes, pitches and forms can bring lowered costs to all manufactured products because: (1) it speeds production; (2) it reduces inventory. NOW, when plans for new and better products are taking shape —now is the time for a united effort to bring about greater standardization of threaded parts



Send for booklet "Selecting the Right Tap for the Job"—18 pages of Facts, Tables, Suggestions

GREENFIELD TAP AND DIE CORPORATION GREENFIELD MASSACHUSETTS

be set firmly against the internal face of the work, else the spider will slip when the tail center is brought to bear against it. If the work is off center and therefore must be corrected by loosening the screws, the spider may slip and allow the work to drop



Spider-Arbor for Handling Thin-Wall Work

—which would be a hazard to both man and machine. Again, if the work is a section of thin tubing, the screws will distort the work and make it "out of round."

To eliminate such difficulties the combination spider-arbor shown in the drawing was designed. The arbor can be made the full length of the lathe and then will handle anything within the capacity of the machine. The center hole in the spider is bored to a sliding fit on the arbor, and the spider hub is tapped for the setscrew **A** with which the spider is locked in position. The end of the setscrew should be ground smooth to prevent burring the arbor.

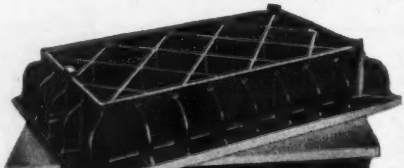
The headstock center must be left in the spindle when the chuck is mounted, so that it can be used to mount the arbor. The chuck is used to grip the work internally.

Each spider should be provided with several sets of setscrews **B**, four of a length to a set, to handle work of different diameters. It is unnecessary to set the screws **B** tight against the internal wall of the work. When working on thin tubing it may be well to put lock-nuts on the setscrews **B** to prevent the screws from working loose due to the light tension.

Grinding Wheel Lifter

A SIMPLE but efficient device has been developed by an employee at the Lycoming Division of Aviation Corporation at Williamsport, Pennsylvania, to enable him to change the

REID *PRECISION-PLANED* SURFACE PLATES

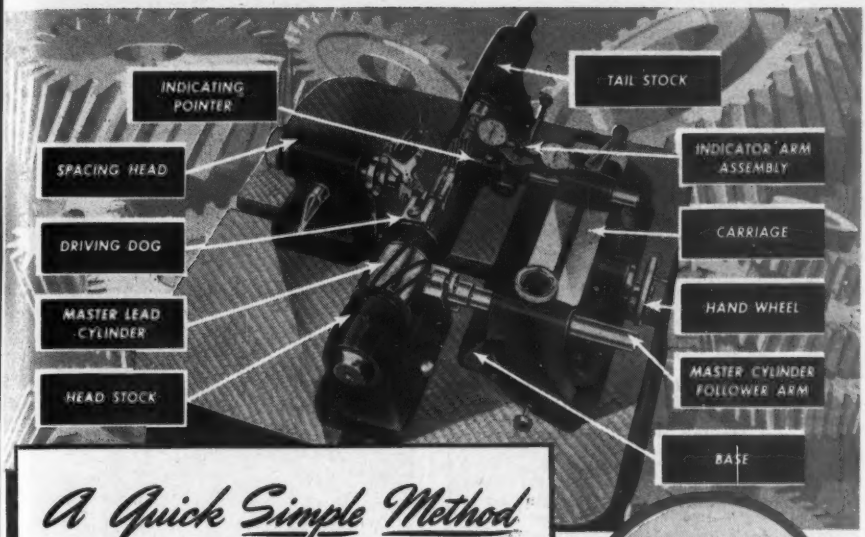


Accuracy guaranteed on 12" x 18" size within .0005". On 36" x 72" within .0015".

Thoroughly normalized and weather seasoned Reid Precision-Planed Surface Plates have proved thoroughly satisfactory on work to close limits.

Excellent delivery—Write for prices—details.

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241 Washington Ave. Nutley, N. J.



A Quick Simple Method OF CHECKING GEAR DIMENSIONS



The RED RING Universal Gear Checker checks the dimensions of spur and helical gears to discover errors in index, helix angle and tooth size, eccentricity, interference and wobble—also errors in the lead of helical gears. • The lead of helical gears is checked against a master lead groove in a hardened and ground master lead cylinder. This cylinder may have as many as ten different grooves to check as many leads. • The design of this equipment is so ingeniously simple that it does not require a skilled mechanic to operate it. Typical small gears may be checked by the average shop man at the rate of 1 per minute. • Three sizes of Gear Checkers are available to accommodate gears up to 12", 18" and 24" O.D.

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CERROMATRIX (Melting Temp. 250° F.) For securing punch and die parts, anchoring machine parts without expensive drive fits, short run forming dies and other metal-working applications.

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large grinding wheels used on his machine without having to call upon a fellow operator for assistance.

A grinding wheel dressed to a given contour is used to produce certain of the radii between bearings on the Lycoming R-680 radial aircooled aircraft engine crankshaft. In order to



Using a Wheel-Lifter of His On Design, the Operator Changes Grinding Wheels on His Machine without Help

provide a relief and the radii of the two main bearings, a wheel dressed to a different contour is required. In view of the critical shortage of abrasives, redressing of the wheel for the latter operation was rejected in favor of using a second wheel specially dressed for the purpose.



In at the finish—"MX" WHEELS

. . . AND IT'S THE FINISH THAT'S IMPORTANT!

IN at the finish of innumerable industrial operations these days are the versatile "MX" Wheels, introduced only a little over a year ago by Carborundum. Burrs, tool marks and other "disturbed metal" resulting from grinding, machining, boring and similar operations are removed in a jiffy. They are ideal for breaking corners and polishing grooves and slots. Surrounding surfaces are kept free of abrasive marks, and tolerances are maintained because of light stock removal.

Vibration and chatter are reduced to a minimum because of the cushioning action. Yet they cut free and clean, and no coolant is used. "MX" Wheels, unlike any other abrasive product made are built up of abrasive grains intermingled with cotton fibres and held together with a suitable binder. For further information write Dept. MM. The Carborundum Company, Niagara Falls, N. Y.

CARBORUNDUM
ABRASIVE AND ALLIED PRODUCTS

THE CARBORUNDUM COMPANY, NIAGARA FALLS, N. Y.

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(Carborundum is a registered trade-mark of and indicates manufacture by The Carborundum Company)

With usual equipment the effort of two men was required to remove the first wheel and replace it with the second. They used a chain block, supported from the arm of a revolving crane, which lifted the wheel in horizontal position.

To simplify the task the operator devised a "Y"-shaped wheel-lifter of scrap iron. The two prongs of the "Y" bolt into the attachment holes at the hub of the grinding wheel, as shown in the illustration. An eye is provided in the upper end of the lifter so that it can be picked up by the hook on the chain block. The lifter is shaped so that the grinding is suspended vertically when raised from the floor; thus the operator is able to slip it into place on the spindle of his machine without additional help.

CUT SET-UP TIME IN HALF with F & H UNIVERSAL VISE!



Just dial the angle.

For grinding compound angles as easily and quickly as simple angles. Suitable for drilling, light milling and other machining operations as well as for layout work. Available with grinding wheel angle attachment.

Vise may be had with 2", 4" or 6" jaws.
2" Universal Vise, $155.
IMMEDIATE DELIVERY

For Clamping Odd-Shaped Pieces
F & H Equihold for instant clamping of work pieces with unparallel planes. Consists of two friction plates jointed together by ball and spring socket.

Write for complete information to:

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10338 Gratiot Ave. Detroit 13, Mich.

Accurate Spacing of Holes on Bolt Circle

From J. T. Patterson

THE article by W. S. Haskell in your September issue "Accurate Spacing of Holes on a Bolt Circle" is interesting indeed so far as its application extends. However, although it involves a single operation of multiplication and the reference to a decimal equivalent scale to obtain the nearest value on the English scale in 64ths, a table of chords based on a unit radius may be worked out by finding the sine of half the subtended angle for the various spacings and multiplying by 2.

For example:

Spacing or chord for 11 holes gives a subtended angle of 32 deg. 43.6 min.; say 44 minutes, and the sine of 16

. . . for more than 1001 odd jobs



The Hjorth Bench Lathe has the speed, accuracy, handling ease, and dependability that appeals to every operator. That's why you'll find the better shops equipping with the Hjorth Lathe.

WRITE TODAY FOR DATA AND PRICES.

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GEAR CUTTERS • UNGROUND GEAR AND SPLINE HOBS • GROUND AND UNGROUND MULTIPLE THREAD MILLING CUTTERS

COUNTER BORES • REAMERS • STANDARD END MILLS AND MILLING CUTTERS FROM STOCK • SPECIAL CARBIDE TIPPED TOOLS

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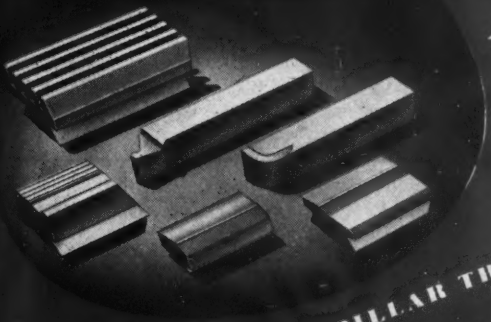
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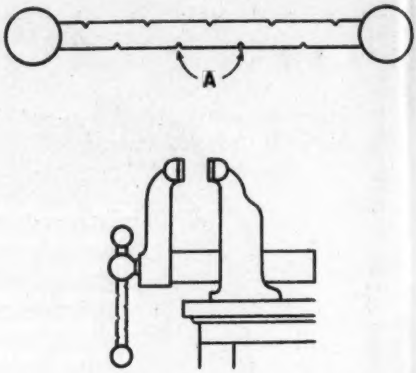
deg. 22 min., 0.2825, times 2, equals 0.563. The factor 0.563 multiplied by the radius of any circle gives the spacing for 11 holes for that circle very closely.

For 13 holes; multiply radius by 0.4787
17 holes; multiply radius by 0.3673
19 holes; multiply radius by 0.3289
23 holes; multiply radius by 0.272.

Keeping the Vise Handle Free

By A. H. Waychoff

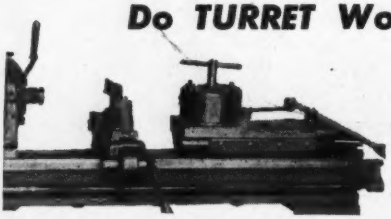
THE vise handle which sticks and binds due to dirt in the swivel hole is a nuisance with which every experienced machinist or bench hand is acquainted. The writer has discovered that if one will file a number of notches in the handle, as shown at



Notches Cut in the Vise Handle with a Three-Corner File Will Keep the Dirt Out of the Hole

A, the sharp edges and slight cavities will tend to cut the usual gum and

Do TURRET Work on BENCH LATHES!



LYNN HEAVY DUTY Self-Indexing **BED TURRET**

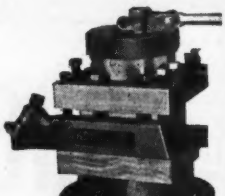
With this sturdy, rigid conversion unit, unskilled help handles accurate screw-machine work—FAST! Quickly pays for itself.

6" head, hardened inserts; 5½" turret travel; fits standard bench lathes up to 14" swing. Handles 6 tools with one set-up. Many exclusive ADVANCED features. Cut-off cross slide also available.

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Self-indexing. For lathes with 12" to 28" swing. Holds 4 tools; indexes to 8 positions. Two indexing pins; tapered inserts. No cams to wear. Solid steel blocks—sizes 5¼", 6½", 8"—to fit your needs. Accurate, fast, rigid, sturdy. Easy to fit and set up.

PROMPT SHIPMENTS. Write for full details.



LYNN MFG. CO., 220 Elroy St., Minneapolis, Minn.

Competitive brand required 30 minutes
CORTLAND did it in 4 minutes

Here's the story . . . Production Test Run at plant of large electric and manufacturing company . . . Hanchett No. 36 Vertical Surface Grinder. Wheel speed 880 R.P.M.; table speed 36 R.P.M. *Work:* solid circular plate 28" O.D., ½" thick; 616 sq. in. surface ground per piece—1 piece per table load.

	CORTLAND	Brand formerly used
Stock Removal	.0140	.0115
Rate of Feed*	.024 - .012	.008 - .004
Cubic inches of stock removed per inch in height of segments	187.6	123.4
Ampere Readings	0 to 50	100 to 125
Dressings Necessary	None	1, rem. .005
Work Heat?	No	Yes
Grinding Time	4 min.	30 min.

17-M

* Faster rate at start grinding high spots. Feed of competitive segments had to be stopped when ampere readings climbed up.





CORTLAND ***Segmental Chucks***

CORTLAND GRINDING WHEELS CORP. • CHESTER, MASS.

grease loose and thus keep the handle free.

In the course of time the notches will become filled with dirt from the hole, but they can easily be cleaned out. The V-notches should be staggered both longitudinally and radially.

Foreign Patents Available

The Alien Property Custodian is now offering a great number of valuable copyrights and patents to American business at prices which represent but a small fraction of their actual value. These copyrights and patents, formerly the property of enemies and persons living in enemy-occupied territories, have been taken over by the U. S. Government and are now available to American manufacturers.

Many of these patents cost their former owners hundreds of millions of dollars and many years of research, but so far American business has shown little interest in them. In December, 1942, approximately 40,000 inventions were made available to the American public, but up to July, 1943, only 369 companies had applied for royalty-free licenses for the use of 3,054 inventions.

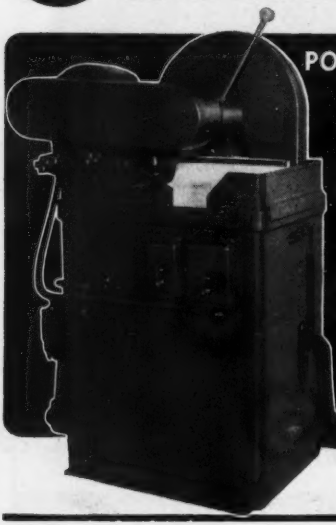
The Office of the Alien Property Custodian has issued a book containing a list of vested patents and patent applications, the price of which is $5. The entire collection of patent descriptions, however, fills 398 folio volumes, which are open to the public at the New York office, 120 Broadway, or at the National Press Building, Washington, D. C., where the custodian has his office. The Custodian's Office is hospitable to inquiries and glad to be of help in supplying information.

Patents formerly held by nationals of enemy countries have now become a permanent possession of the United States Government,and will never be returned. Only 40 per cent of the available patents are more than 10 years old. Many American industries benefited from the use of enemy patents after the last war, and it is sound to assume that even more valuable patents are available this time. Here is a potential goldmine, waiting for post-war exploitation.

(Condensed from Printer's Ink)

CATSKILL Abrasive Cut-Off Machine

CUTS FASTER, SMOOTHER, STRAIGHTER



POWERFUL · ACCURATE · SAFE

Cuts solids to 2" and tubing and shapes to 3"—cleanly—without secondary finishing operations.

MODEL "W"

Cutting wheel runs in slotted pipe through which coolant is piped. This prevents surface hardening, burr and burn, and insures a smooth, finished cut.

WRITE FOR FOLDER

ON GEAR BLANKS
DIE BLANKS
TUBING
EXTRUDED BARS
CYLINDERS
HIGH CARBON STEEL
UNANNEALED STOCK
PIPE
AND MANY OTHER MATERIALS

CATSKILL METAL WORKS, INC.
CATSKILL, NEW YORK



1 1⅛" left hand spiral, right hand cut end mill.

2 ¹³⁄₁₆" two flute, double end router bit.

3 ⅜" extra long, four flute, double end mill.

Even These Are

STANDARD TOOLS

ON HAND FOR

48-HOUR DELIVERY

Standard lines of Putnam Hi-Speed End Mills include not only every popular size and type of tool but many which, from any other source, would be considered "special" cutters. As examples, the three tools illustrated are carried in stock. These, like all other standard Putnam Tools, are now available for 48-hour delivery.

For complete information, see your nearest Putnam representative or write directly to the factory.

TOOLS THAT
• CUT FASTER
• LAST LONGER

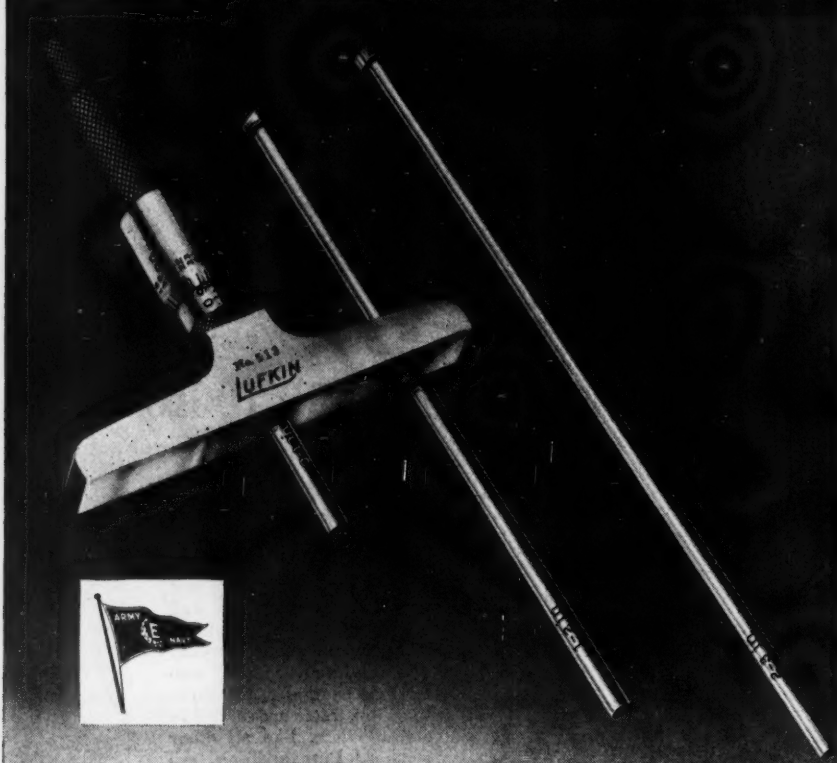
Hi-Speed End Mills • Centimeter Pilot Counterbores • Spiral Fluted Chucking Reamers

AWARDED AUG. 15, 1942

PUTNAM TOOL COMPANY

2981 Charlevoix Avenue • Detroit, Michigan

LUFKIN MICROMETER DEPTH GAGE



CHECKS DEPTH OF HOLES AND SLOTS QUICKLY, ACCURATELY

Here's the tool designed expressly for obtaining the depth of holes and slots with micrometer accuracy. Gage is provided with three rods (5/32" diameter) which permit measurements from zero to three inches by thousandths. Patent lock nut locks rod at any desired point. Write for catalog.

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LUFKIN

SAGINAW, MICHIGAN · NEW YORK CITY

TAPES · RULES · PRECISION TOOLS

PRODUCTION MEN:

COULD YOU PIERCE 100 HOLES THROUGH A TEMPLATE IN 10.25 MINUTES?

The ACTUAL TIME STUDY RECORD as reported by FEDERAL TELEPHONE & RADIO CORPORATION



Photos Courtesy Federal Telephone & Radio Corp.

Wiedemann Turret Punch Presses are doing yeoman work at Federal Telephone and Radio Corporation, and hundreds of other companies where short run piercing of sheets and plates must be done at practically long-run low cost and with consistent high accuracy.

The Type R-44 Turret Punch Press illustrated is especially designed for piercing through templates — and incorporates speed of location and piercing, with a unique safety device which makes it impossible for the operator to damage the template. A companion machine, the Type R-43 Micro-Turret Punch Press, produces the templates . . . each hole accurate to ± .002".

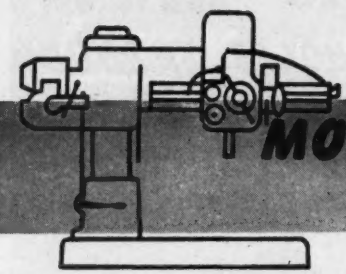
You too can by-pass the high cost of short run piercing by putting Wiedemanns in your production line . . . for piercing holes up to 3" in ½" stock . . . 8 to 80 tons capacity . . . 8 to 24 punches and dies at your fingertips with a choice of labor-saving gauge tables.

MAKE THE COMPARISON! The significant time and labor-saving facts about Wiedemann Turret Punch Presses are detailed in Bulletin 92, "The Story of Short Run Piercing Economy." A copy will be sent by return mail. Savings up to 2000% have been reported by users!

WIEDEMANN MACHINE COMPANY

1821 SEDGLEY AVENUE, PHILADELPHIA 32, PA.

WIEDEMANN TURRET PUNCH PRESSES & GAUGE TABLES



MODERN EQUIPMENT AT WORK

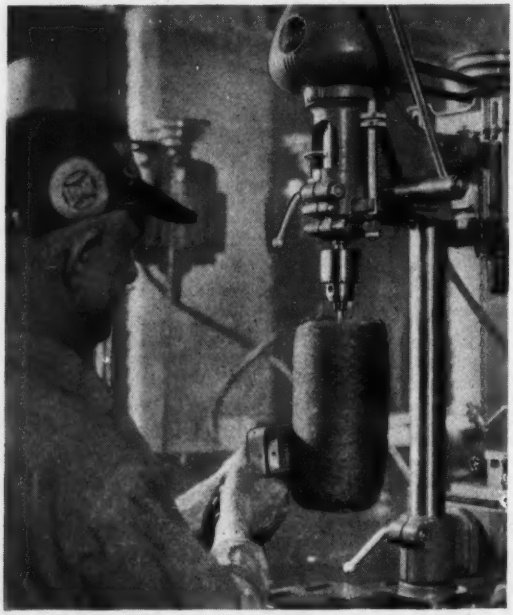
Steel Wool Removes Burrs

THE illustration shows a type of deburring tool which has become popular with many manufacturers for removing burrs from non-ferrous metal parts. The tool is simple, consisting of a quantity of ribbon-type steel wool wound on a spindle that is held in the chuck of a drill press. It happens that the machine shown here is a Delta bench drill, which is approximately the correct size for working on small parts.

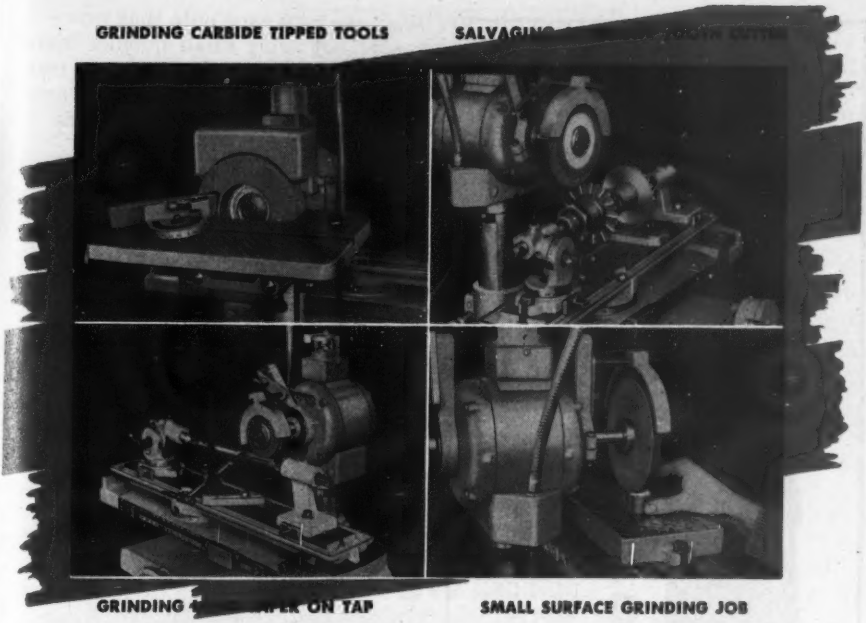
To make a de-burring tool of the type shown, cut a piece perhaps 7½ to 10 inches long from a shaft or section of steel tubing of the size that will fit into the drill press chuck, then slot one end of the piece for about ¾ inch to provide for anchoring the steel wool. This done, wind ribbon-type steel wool around the piece until it is the diameter required. The picture indicates that the diameter of the finished winding is about one-half the length. Leave one end of the shaft free for chucking.

With the completed tool chucked in the machine, set the speed for approximately 1700 r.p.m., start it running, and hold a wood block against the steel wool for a few revolutions to give it shape and blend any straggling ribbons into the mass.

In operation, the steel wool quickly removes the burrs from non-ferrous metal parts without damaging the surface of the workpiece. As the wool wears down, additional steel



Deburring Tool Made from Steel Wool

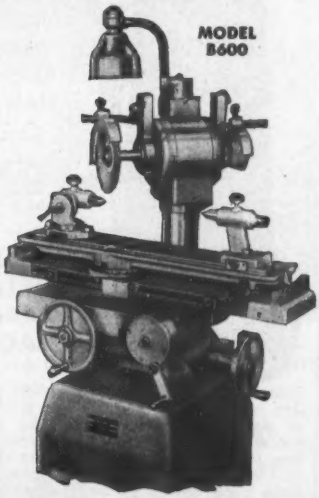


THE NEW *Knock-Out*
UNIVERSAL TOOL GRINDER

Production or Maintenance
At Low Cost

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New 16-Page Literature
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KNOCK-OUT

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UTG-43-M

THE K. O. LEE CO.
ABERDEEN SOUTH DAKOTA

QUICK
MARKING
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PART
NUMBERS



MARKING BY ROLLING IS FAST AND ECONOMICAL.

PRESERVES DIE LIFE AND PIECE PARTS.

REQUIRES ONLY FRACTION OF APPLIED PRESSURE AS COMPARED TO STAMPING.

QUICK SET-UPS

MODEL 25 HI-DUTY MARKING MACHINE

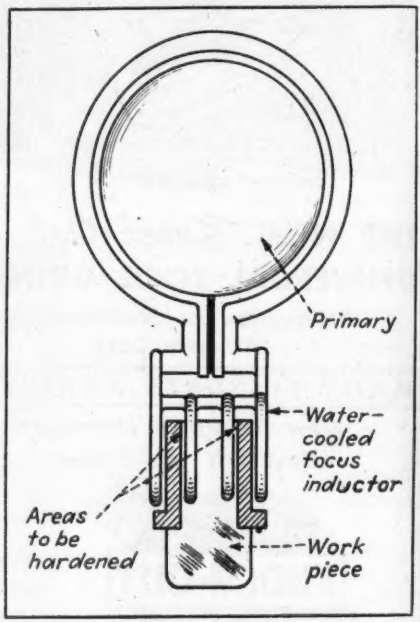
This machine operates from your plant air line, and is one of numerous models built to produce fast, neat marking on metal parts. Hi-Duty marking machines may be had for practically any marking operation, and we will be glad to make recommendations upon receipt of your inquiries. Send prints or samples of parts to be marked, showing lettering and location, also state required production.

GEO. T. SCHMIDT, Inc.
1806 BELLE PLAINE AVE.
CHICAGO 13, ILLINOIS

wool can be wound onto that which remains. By using small spindles wound in the same manner, tools can be made for deburring interior surfaces of small holes short radii, or inside corners.

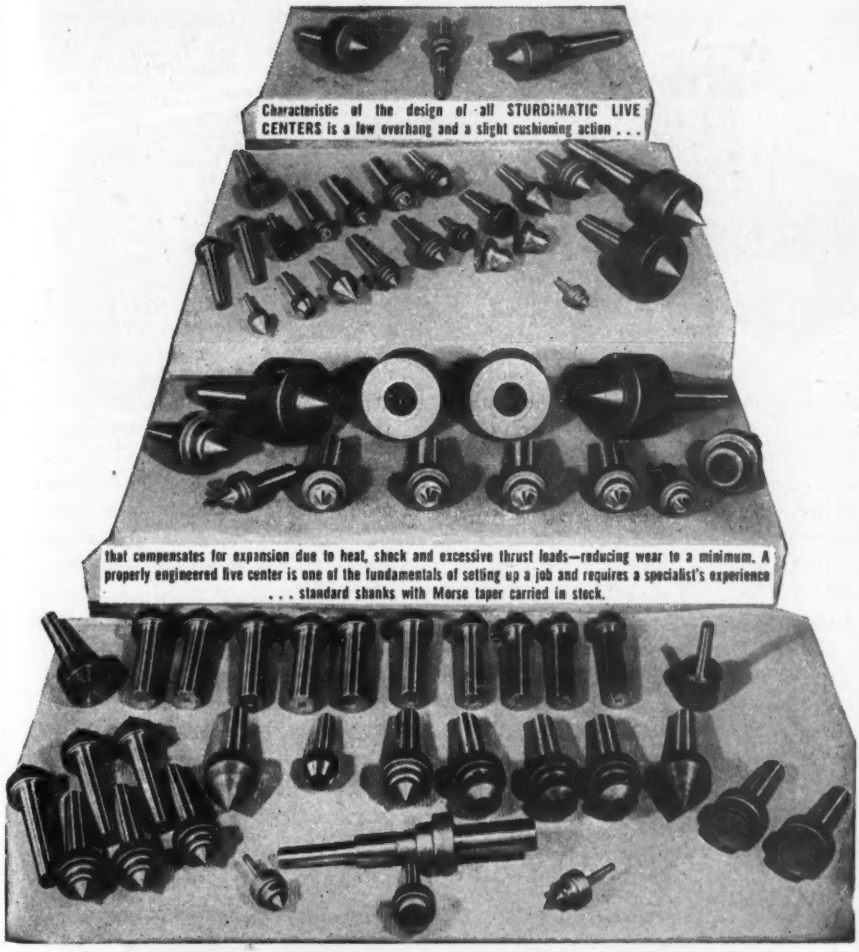
Ordnance Part Hardened by Induction Heat

QUICK, localized heat-treatment of this ordnance part is made possible by a unique induction heating coil. The focus inductor, designed



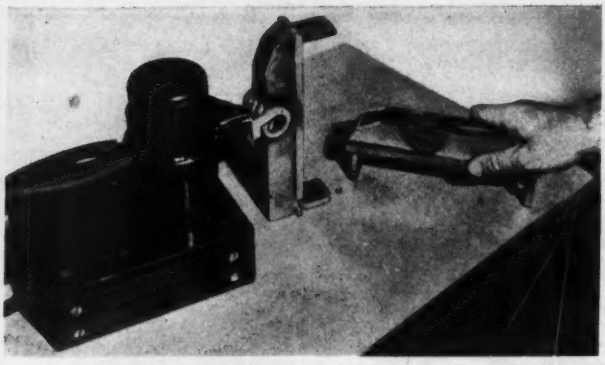
Drawing of Induction Heating Coil Designed for Heating an Ordnance Part for Hardening

by Ajax Electrothermic Corporation to concentrate the heat in small areas on both walls of the part, is of modified helical shape and is designed to fit the standard primary of the Ajax



Send us your specifications and blueprints—We will see that your job is set up with the right LIVE CENTER—prompt deliveries on high priorities.

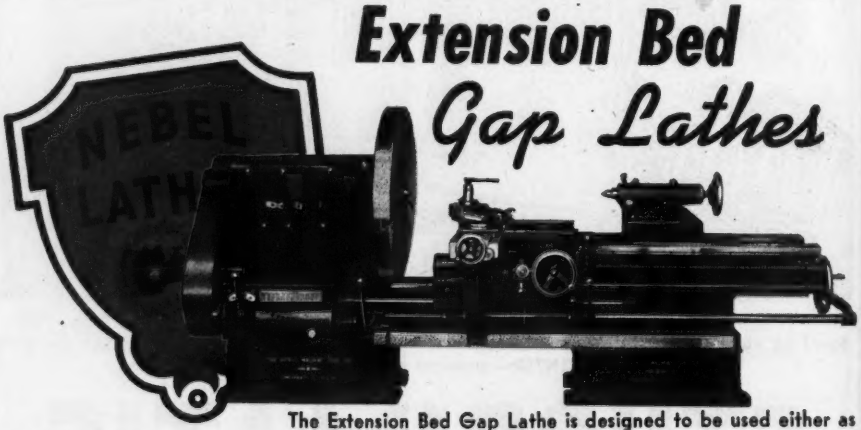
STURDIMATIC
TOOL COMPANY
5222 THIRD AVE. DETROIT, MICH.



Ordnance Part in Position for Heating. Note Heating Pattern on Part at Right, Which has Been Heat Treated and Quenched

focus inductor assembly. The two walls of the part fit between the coils as shown in the sketch. Area of maximum heat is accurately concentrated at the center of the coil at the areas to be hardened.

The specially designed heating inductor and holding jig can easily be replaced by another special inductor and jig for any other special job. The heating pattern is shown on the part that has just been heat-treated and quenched. The inductor coil is water-cooled. Heating time is 35 seconds at a frequency of 35,000 cycles per second. Power source is the standard Ajax-Northrup 6 kw. spark-gap converter.



Extension Bed Gap Lathes

Illustrated is the Series "AG" 20/40" Extension Bed Gap Lathe. Also made in 28/50" Heavy Duty.

The Extension Bed Gap Lathe is designed to be used either as a gap lathe or an engine lathe.
We also manufacture a line of regular geared head engine lathes.

Write for circulars.

The Nebel [illegible] Tool Co.
CINCINNATI OHIO

PROSSER
CARBIDE GRINDERS



MODEL AA



MODEL EE

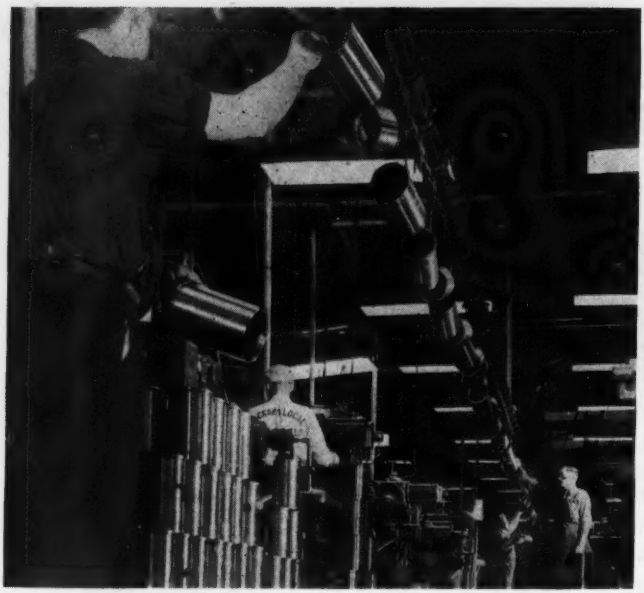
● Modern, streamlined grinders for most rapid rough grinding and finest finishing of carbides, stellite, high speed steel, and other modern tools.
Bench and floor type machines, of several capacities, for wet or dry grinding, as desired. Attachments for chip breaker and drill grinding.

FEATURES OF PROSSER GRINDERS

- Quick-acting indexing tables.
- Adequate wet-grinding equipment.
- High grade ball bearing spindles.
- Oversize wheels, giving longer wheel life, and permitting grinding of larger tools.
- Moderate price.

Prompt Deliveries
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Mechanical Conveyor Eliminates Trucking

Conveyor Speeds War Production at Packard

MECHANICAL devices for handling materials are used wherever possible at the Packard plant in Detroit, which is now turning out Rolls-Royce aircraft engines. Shown here is an automatic conveyor line which extends throughout the cylinder liner machining department. Upon completion of an operation on a liner, the workman hangs it on the conveyor to be carried to the next operation. Mechanical handling eliminates the need for trucks and truckers, and ensures the prompt movement of materials through the production departments.

Mahr Gas Fired Babbitting Furnace is covered as to features, specifications, and sizes available in Equipment Bulletin No. 270 published by Mahr Mfg. Co., Division of Diamond Iron Works, Inc., Minneapolis, Minn. Illustrations, descriptions, and specifications of portable and stationary oil fired babbitt pots are also included in the bulletin, copy of which is available free upon request.

"OUTWEARS the best Bronze Metal"

20 years ARGUTO without a drink—

ARGUTO OILLESS BEARING CO.

Wayne Junction, Philadelphia, Pa.



...You too can be ahead of schedule and your production out on time, if you install dependable Lima Gearshift Drives on your machine tools and other production equipment.

With Lima Gearshift Drives, you have flexibility of operation, speed, power and safety to do the big jobs required in turning out precision equipment for our armed forces.

Lima Gearshift Drives, adaptable to lathes, milling machines, drills, boring mills, shapers and all other machine tools and equipment requiring selective speeds, can help you in the "home-front" drive for accurate, faster, safer production.

Increased production will beat the Axis—LIMA will keep you ahead of schedule. Wire or write for address of Lima Engineering Service nearest you.

Large enough to successfully serve you, yet small enough to give personal attention to your needs.



THE LIMA ELECTRIC MOTOR CO.

170 FINDLAY ROAD

LIMA, OHIO

REPRESENTATION IN MOST PRINCIPAL CITIES

LIMA GEARSHIFT DRIVES - LIMA ELECTRIC MOTORS
LIMA MAGNETIC POLISHING LATHES - LIMA PEDESTAL GRINDERS



PART NUMBERS

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ROLLED

BY MACHINE

ON

FLAT *and* ROUND SURFACES

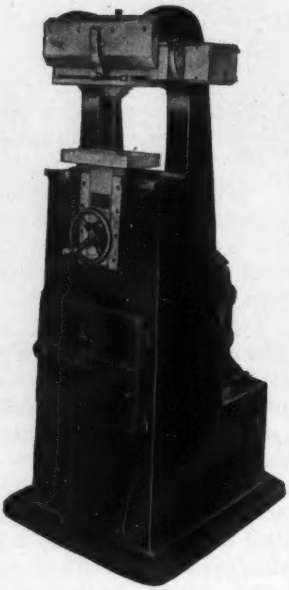
Sure - Fast - Accurate

OBSOLETES HAND STAMPING

SAVES [PARTS LABOR STAMPS

Eliminates POOR MARKING ERROR — NOISE

Speeds . . . DELIVERIES



MODEL 175

ALSO ADAPTED TO CERTAIN KNURLING OPERATIONS

This Hydraulic Machine will mark piece parts quickly and accurately. It is serving in the war effort in many plants for marking components of guns, tanks, planes, motors, engines, shells, and practically every metal part produced for war equipment. Machine will mark unlimited number of sizes and shapes when equipped with proper tools and fixtures. It will also do an excellent knurling job on solids and shells of small diameters.

Designed and Built By

GEO. T. SCHMIDT, INC.

1806 BELLE PLAINE AVENUE CHICAGO 13, ILLINOIS



MURCHEY

Threading Tools

4 WEEKS DELIVERY

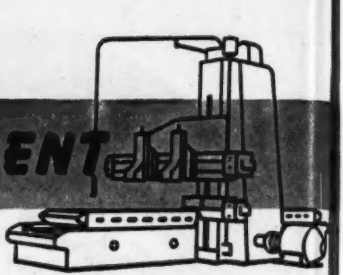
● This Type "G" (non-rotating) Self-Opening Die Head has established an enviable record. It is regarded with highest respect and admiration wherever threaded parts are needed to help win America's production battle. Type "G" is designed and engineered for use on any machine where die heads do not rotate. Made in sizes from 7/16" up to and including 6".

Write for literature on Type "G"—also on a companion product, Type "C-O" (rotating); on Collapsible Machine Tap Type "B-M" and on Murchey Thread Milling Machines, Shell Tapping Machines and Roller Pipe Cutting-off Machines.

MURCHEY MACHINE & TOOL CO., Dept. M-3—DETROIT 26, MICH.

MURCHEY

NEW SHOP EQUIPMENT



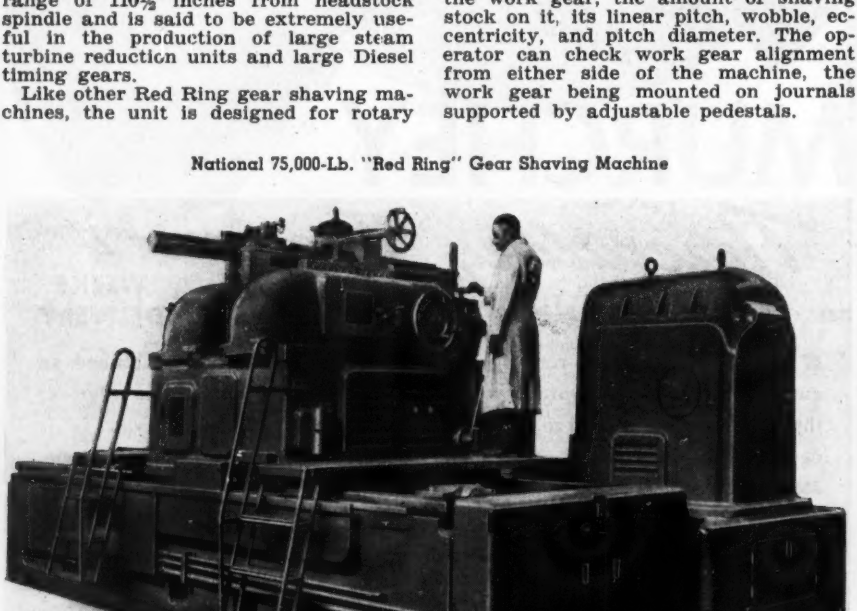
National 75,000-Lb. "Red Ring" Gear Shaving Machine

National Broach & Machine Co., 5600 St. Jean Ave., Detroit, Mich., announces the addition of a 75,000-lb. gear shaving machine for gears from 24 to 96 inches pitch diameter and up to 97 inches outside diameter to its line of "Red Ring" products. The machine is provided with a base 20 feet x 12 feet 11 inches and stands approximately 11 feet above the floor line. It has a maximum shaving range of 110½ inches from headstock spindle and is said to be extremely useful in the production of large steam turbine reduction units and large Diesel timing gears.

Like other Red Ring gear shaving machines, the unit is designed for rotary crossed axes shaving. The cutter head is equipped with a vernier scale and sine bar so that settings to any desired angle within the range can be readily made and accurately duplicated thereafter. The cutting tool, which is free to rotate, is driven by the work gear.

An important advantage is that characteristics of the work gear may be accurately checked without removing it from the machine. The checking head, which is an integral part of the machine, is used to determine the size of the work gear, the amount of shaving stock on it, its linear pitch, wobble, eccentricity, and pitch diameter. The operator can check work gear alignment from either side of the machine, the work gear being mounted on journals supported by adjustable pedestals.

National 75,000-Lb. "Red Ring" Gear Shaving Machine



The headstock is a self-contained unit, having its own motor drive, special journaled sleeve-type bearings, and change gears to regulate the speed of rotation of the work gear. The latter is driven through a flexible coupling. The cutter head and checking head are mounted on a saddle, and this saddle assembly is also a self-contained unit with its own motor drive, pressure lubrication, and controls which govern the length of stroke.

The cutter head slide is reciprocated across the face of the work gear during the cutting cycle, and is equipped with automatic feed and a pre-selector for varying the amount of feed. The cutting cycle can be either manually or automatically controlled.

Pressure lubrication is provided thruout, and all lubricant reservoirs are equipped with sight gages. The saddle ways are lubricated by automatic gravity feed. All ways are hardened and ground. Coolant supply lines and electrical control conduits extend through the rear of the machine base to a convenient manifold arrangement below the saddle.

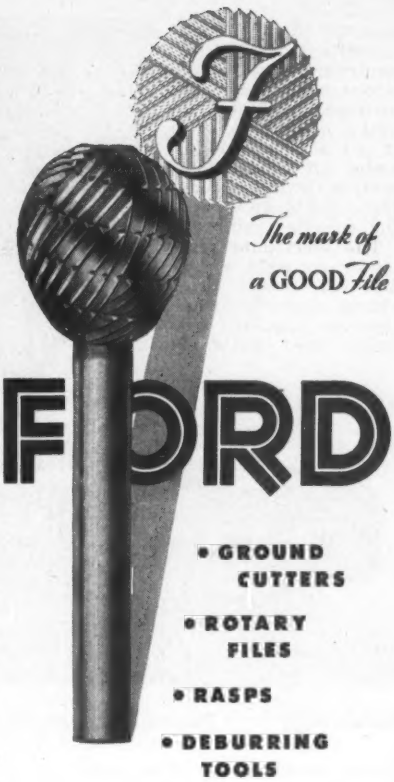
In the accompanying illustration, the operator is shown in position to start the cycle and is within easy reach of push buttons which control the complete operation of the machine. At this same control station is a master stop, saddle feed selector, coolant control, and headstock control for forward and reverse movements and for stopping. A bank of lights shows the operator whether or not the saddle is in feed and the direction of movement.

On the other side of the machine, opposite from that occupied by the operator in the illustration, is a similar control station. At the base of the work headstock is a third control station with a master stop push button and push button for jogging the work spindle either forward or reverse

All parts of the machine are readily accessible for inspection or adjustment and adequate leveling jacks are provided.

Reed-Prentice No. 4 Vertical Milling Machine with Electronically Controlled Power Down Feed

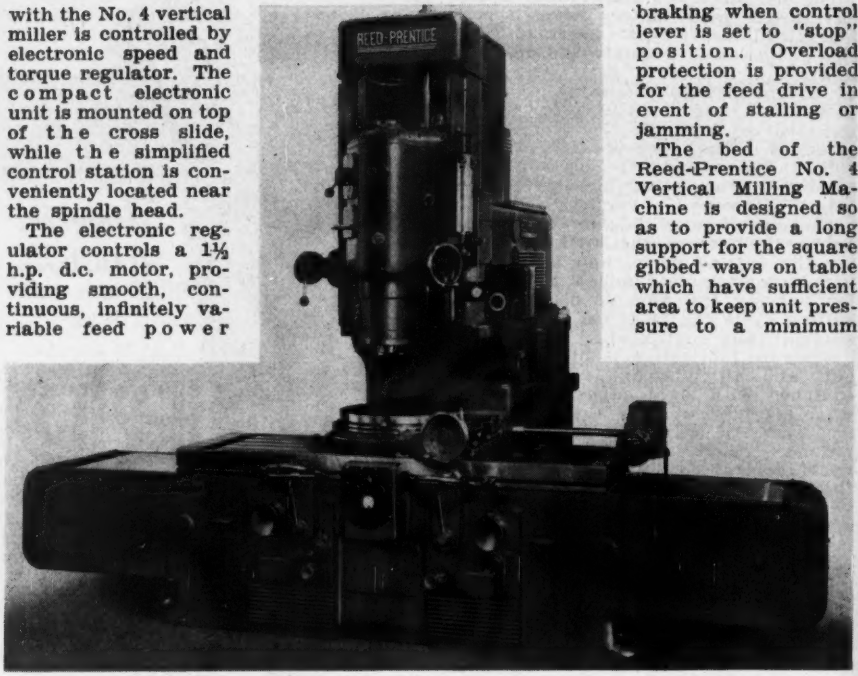
Further changes and improvements in the design of its No. 4 vertical milling machine are announced by the Reed-Prentice Corp., Worcester, Mass. Power down feed for either drilling or boring



FORD methods produce hard biting, fast cutting tools that stay sharp longer—and last longer. Look into this *complete* line. Send for catalog showing many shapes and sizes. M. A. Ford Manufacturing Company, Inc., 744 W. First St., Davenport, Ia.

with the No. 4 vertical miller is controlled by electronic speed and torque regulator. The compact electronic unit is mounted on top of the cross slide, while the simplified control station is conveniently located near the spindle head.

The electronic regulator controls a 1½ h.p. d.c. motor, providing smooth, continuous, infinitely variable feed power



braking when control lever is set to "stop" position. Overload protection is provided for the feed drive in event of stalling or jamming.

The bed of the Reed-Prentice No. 4 Vertical Milling Machine is designed so as to provide a long support for the square gibbed ways on table which have sufficient area to keep unit pressure to a minimum

Reed-Prentice No. 4 Vertical Milling Machine with Electronically Controlled Power Down Feed

to the vertical head. The electronic unit and controller which make up the circuit operate on 50 or 60 cycle, single phase line in the range between 200 and 600 volts. The circuit has an inherent safety factor, providing a natural increase or decrease in motor speed to the selected feed rate. The desired feed is said to automatically hold within a fraction of an r.p.m. The circuit is self-

under heavy loads. The ways are pressure lubricated and are equipped with a new type of sheet metal cover to prevent dirt and chips from falling into them. When the table travels to one end or the other of the bed, the way cover slides in a special track provided at each end.

The table is cast of Meehanite, 7½ inches thick, and is provided with five T-slots and coolant pocket at each end.

REYNOLDS Coolant Units for Machine Tools

"KEEP 'EM COOLER IN ACTION"

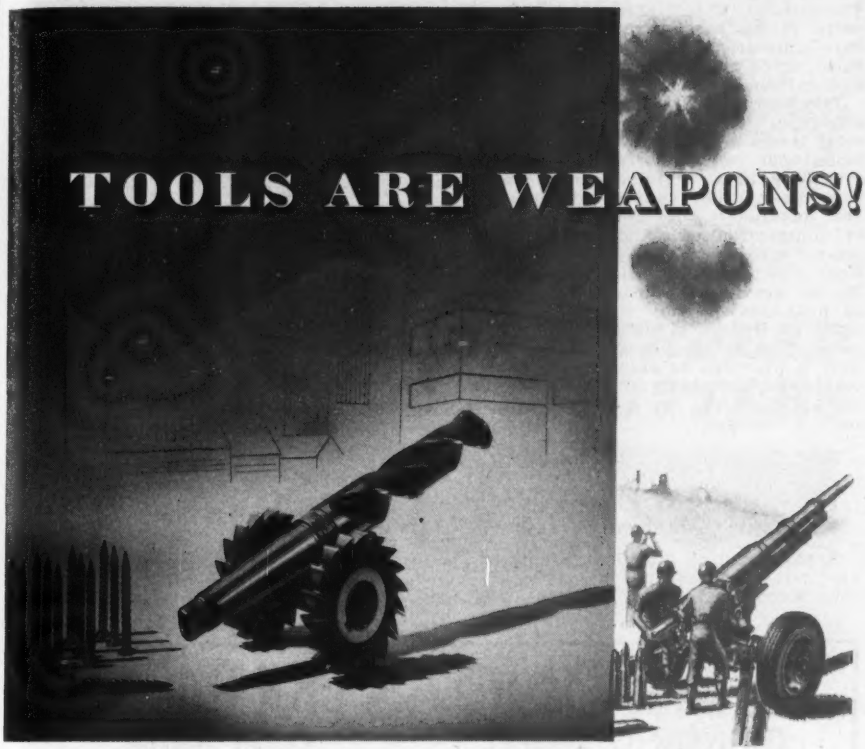


No. 206 (left) Approximately 15 gal. capacity P.M. Tank 20" x 16" x 16". ⅓ H.P. motor. For grinding machines, multiple spindle drills. $95.00 each for the 110 volt 1 phase model, and 220 volt, 3 phase model. $112.00 for the 550 volt, 3 phase model.

No. 1-s (right) Approximately 7 gal. capacity P.M. 16" x 10" x 11" tank. ¼ H.P. motor. For Milling and Screw Machines, Lathes, etc. $98.50 each for 110 volt 1 phase model, and 220 volt, 3 phase model. 550 volt, 3 phase model, $108.50.



REYNOLDS MACHINERY CO., 211 EDDY ST., PROVIDENCE, R. I.



NATIONAL cutting tools are *fighting* tools. They are built to take it—to stand up when the production pace is pressing.

Even the toughest tools produce more work with proper care. That's why the craftsmen who make National tools ask you to sharpen them regularly, be generous with the coolant. Work them hard but work them right!

NATIONAL

NATIONAL TWIST DRILL & TOOL CO. DETROIT U.S.A.

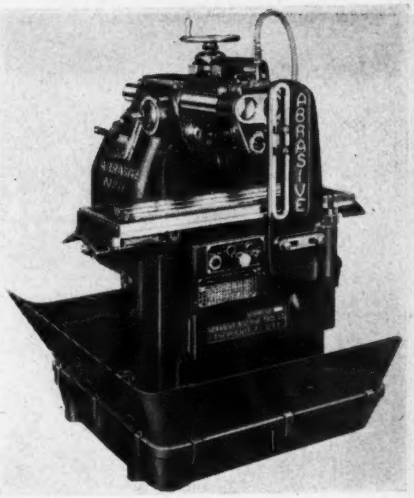
TWIST DRILL AND TOOL COMPANY

HOME OFFICE AND FACTORY—DETROIT, MICH.

Tap and Die Division—Winter Brothers Co., Wyandotte, Mich.

The column, which houses the hydraulic units in its base, includes wide pressure-lubricated ways for the heavily constructed cross slide that supports the vertical head.

The vertical head is equipped with a spindle of heat-treated chrome-vanadium steel mounted on widely spaced precision taper roller bearings at the nose, providing great rigidity, and a double-row taper roller bearing at the upper end, mounted to allow for axial expansion or contraction of spindle. The spindle nose conforms to the National Machine Tool Builders Association standard No. 50. All gears in the head are helical and of heat-treated alloy steel, and are lubricated from a pump supplying a cascade of oil to all moving parts. A window is provided to show oil circulation. A spindle lock built into head prevents the spindle from being started until the lock is released.

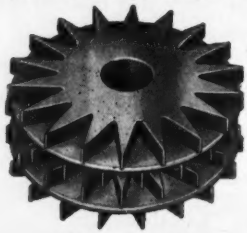


Abrasive B-11 Plain Milling Machine

Abrasive B-11 Plain Milling Machine

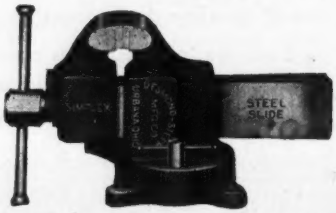
A plain milling machine designated as the B-11 has been brought out by Abrasive Machine Tool Co., East Providence 3, R. I. The machine is a manufacturing-type unit with completely electrical control for table and spindle power

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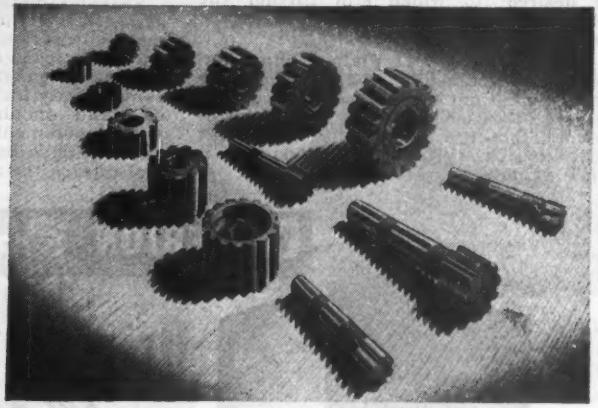
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DETROIT TAP & TOOL CO.

8432 BUTLER
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movements. Its capacity is ample for most work of medium size, and the machine is said to be ideally adapted to production milling operations.

The Abrasive B-11 Plain Milling Machine has a built-in backlash eliminator on the table screw which is released automatically during the fast travel, thus permitting climb milling in either direction up to the capacity of the driving motors. Table movement can be quickly and precisely changed by means of the electrical controls. Other outstanding features include automatic reverse, fast table travel of 300 inches per minute, and an unusually wide selection of feeds and speeds.

According to the manufacturer, the B-11 is smooth and quiet in operation and offers great flexibility in performance. An additional set of dogs and extra table motor controls may be used, if desired, to widen still further the choice of milling cycles provided by the machine.

The Abrasive B-11 Plain Milling Machine is designed throughout for easy operation. Controls are readily accessible and most set-up adjustments can be made from the front of the machine. Adequate safety features provide protection to both operator and machine.

Bliss 1,100-Ton Self-Contained Hydraulic Forging Press

The Bliss 1,100-Ton Self-Contained Hydraulic Forging Press illustrated herewith, product of the E. W. Bliss Co., 53rd St. and 2nd Ave., Brooklyn 32, N. Y., features a 35-ton ejector and sliding die table. The press is electrically controlled, the controls being so interlocked that the main slide, die slide, and ejector can be operated only when the different units are in their proper positions. The 150 h.p. pumping unit installed on the machine provides main slide with advance speed of 750 inches per minute, pressing speed of 37 inches per minute, and return speed of 725 inches per minute. Presses with faster speeds and in capacities up to 1,500 tons can also be obtained.

Various methods of operation are available for the main slide: semi-automatic operation — the slide completing one press cycle and then stopping; fully automatic operation—the slide operating continuously until a stop button is pushed; and inching control, permitting small increments of approach of the slide by push button. This inching control retains the same safeguards against

CRITERION *Boring Heads*



Original Accuracy *Maintained*

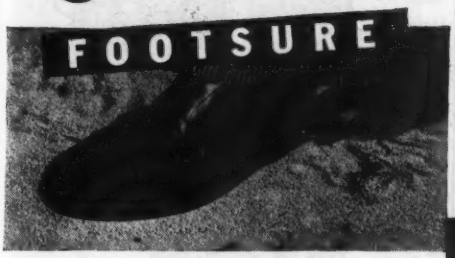
Noted for maintaining original accuracy over a longer period Criterion Heads are smooth, compact, rigid. Parts subject to wear are hardened. Lead screw is hardened tool steel, with threads ground from solid after hardening. All heads have large, graduated dial. Large offset adjustment eliminates need for offset boring bars. Two sizes: 1½" and 3". ½" and 1" bar capacity. Shanks are interchangeable, enabling operator to use head on different machines. Ideally adapted for slide boring tool holder on small turret lathes. Ask your dealer or order direct. Request free literature.

Lead Screw ground from solid AFTER hardening.

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SAFE
CLEAN FLOORS with this New Dry Compound!



Absorbo, when scattered over oily or greasy floors provides safe, sure footing. It's not necessary to sweep up re-occurring oil spills repeatedly, as Absorbo will retain oil or grease up to 45% to 50% of its weight.



Absorbo will not mar machine parts or surfaces. It may be used freely without abrasive action on all types of floors—wood, metal, concrete or linoleum.



Absorbo has been approved as a Class 1 non-combustible by Underwriters' Laboratories. Even when thoroughly oil-soaked it will resist burning.

Send the coupon for a trial 50 lb. bag with an unconditional money-back guarantee.

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Gentlemen: Send..... 50 lb. bags of: Absorbo Oil & Grease Absorbent and Floor Cleaner at $2.75 per bag, F. O. B. Newark 4, New Jersey.

Substantially reduced prices for quantities.

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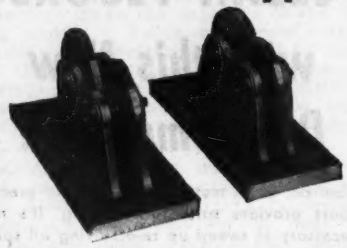
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A sub base can be made of proper height to give necessary clearance for large diameter work.
Supersensitive ball bearings and hardened and ground spindles assure accuracy.

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36" x 48" . . . semi-steel . . . accurately machined. Securely mounted cast legs are machined and provided with adjusting screws for perfect alignment. Shipping weight, 1300 lbs. Also larger or smaller plates with planed or scraped surface. We also manufacture angles and parallels as shown underneath surface plate.

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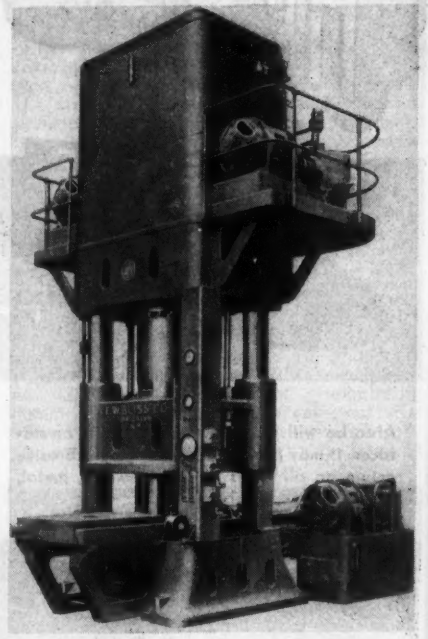
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Engineers and Machinists Since 1907

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over-pressure and over-travel as the production control.

Sequence on first or second method may include operation of die slide and ejector. An advantage of the third method is the fact that the pressure



Bliss 1,100-Ton Self-Contained Hydraulic Forging Press

switch can be set so that the press slide reverses at a predetermined pressure even though the inching button is held in down position.

Cone-Drive Standardized Industrial Turbine Reduction Unit

A standarized industrial turbine reduction unit featuring area-contact double-enveloping Cone-Drive gearing is announced by the Cone-Drive Division, Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich. The unit is available in 26½ and 37 h.p. base ratings, the former type having Cone-Drive gears of 4½-inch center distance and

ONE MORE LESSON WAR HAS TAUGHT



The urgent demand for great quantities of war goods has led to a high degree of mechanization in industry. Wherever possible, machines are doing work formerly performed by hand labor . . . and are doing it better, faster, cheaper.

The lesson will be completely learned only when all concerned realize that the same benefits accrue in the production of *peacetime* goods. The same machines and tools that are helping us win the war can mean higher standards of living, better health, comfort, and convenience for *all* — workers and management alike — when Victory is won.

Among the fine machines that have a part in this lesson of war and peace are Millers Falls portable electric tools, typical Millers Falls *quality* products.

MILLERS FALLS TOOLS
SINCE 1868

MILLERS FALLS COMPANY • GREENFIELD, MASS., U.S.A.



Cone-Drive Standardized Industrial Turbine Reduction Unit

the latter type, Cone-Drive gears of 6-inch center distance. Both types are designed to operate on input speeds of 5,000 to 6,000 r.p.m. and can be obtained in a variety of standard ratios ranging from 3½ to 8 to 1.

Self-contained, the Cone-Drive Standardized Industrial Turbine Reduction Unit is equipped with built-in oil pump and oil cooler, oil filter and pressure relief valve, pressure gage, thermometer and oil level gage. The lubrication system is of the force feed type.

Gray-Mills Model 400 All-Purpose Industrial Fluid Cooler

The Gray-Mills Co., 217 W. Ontario St., Chicago 10, Ill., announces the Model 400 all-purpose industrial fluid cooler shown herewith which is said to be particularly adaptable to the cooling and temperature maintenance of industrial fluids used in metal cutting, hydraulic systems, maintenance of submerged bearing temperatures, quenching, cooling spot welding machines, and laboratory and development work. The unit is designed to mechanically refrigerate fluids (no water or water connections required), settle and screen out chips and the coarser abrasives, and apply the fluid to the work through the medium of a self-contained pump.

The Model 400 fluid cooler is equipped with a 1 h.p. compressor rated at 11,800 B.T.U., and is available with either

REMOTE *Production Control*

Wonderful opportunities to improve production control are opened up by Wizard Electric Counters. Wizards count anything that will actuate a switch, relay or photo-electric unit. They may be installed at any distance from the actual source of count. They can be centrally located to give a continuous count on operations throughout the plant.

Complete Catalog on request. For suggestions, just tell us what you want to accomplish.





Production Instrument Company

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OTHER SUPER CARBIDE TIPPED TOOLS FOR

Turning, Facing, Reaming, Spotfacing, Forming, Grinder Rests, Wear Parts, Boring, Drilling, Grooving, Counterboring, Shaving, Centers and Special Purposes.

Of course he's satisfied! Like most production men who use Super Carboloy-Tipped Milling Cutters, he is getting faster, more accurate and more economical milling production. He is typical of users throughout the country who report such amazing production records as these . . . "With Super Milling Cutters we decreased the cutting time on one job 200%." "On a bronze alloy job we increased the number of pieces per grind 700%." "On a steel milling job we now complete a standard run in 2 hours that formerly took 8 hours."

Other users of Super Carboloy-Tipped Milling Cutters will tell you that in cast iron and non-ferrous materials they can run at machine capacity with feeds of .002″ to .005″ per tooth. In steel with tooth loads of .0005″ to .0025″ they can run at surface speeds of 400 to 800 feet per minute. That's performance you shouldn't overlook in times like these!

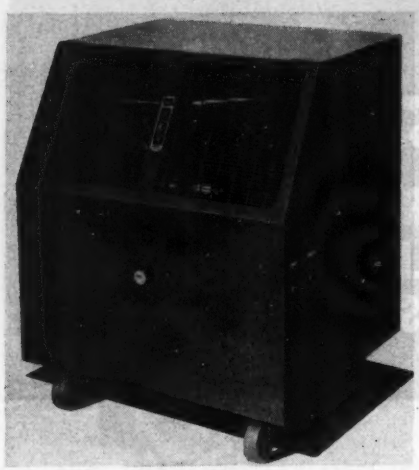
Why not learn more of the advantages of these milling cutters that are establishing new records in speed, accuracy and economy on all types of milling operations? Let us send you a descriptive folder.

(All sizes available for early shipment)

SUPER TOOL COMPANY

Carbide Tipped Tools

21650 Hoover Road, Detroit 13, Michigan ★ 4105 San Fernando Road, Glendale 4, California



Gray-Mills Model 400 All-Purpose Industrial Fluid Cooler

centrifugal or gear-type coolant pump operated by a ½ h.p. motor. The centrifugal pump has a rated capacity of 3,000 g.p.h. (water at no head) at 7 lb. pressure, and the gear pump is rated at 180 g.p.h. at 50 lb. pressure. The cooling tank has a capacity of 35 gallons and is equipped with removable 45-deg. settling and filtering screens (available in various meshes) and baffle plate for removing chips and the coarser abrasives.

Compactly constructed, the Gray-Mills Model 400 All-Purpose Industrial Fluid Cooler occupies a floor space of 28½ x 33 inches and measures 44 inches high. The unit is completely portable and can be readily put into operation by simply plugging into a power line.

Airflex Spinner Riveter with Advance Pressure Pad

Designed to facilitate the riveting of assemblies of two or more parts, a spinner riveter with advance pressure pad is now being manufactured by Airflex Equipment Co., 13255 Birwood, Detroit, Mich. The pressure pad consists of an aluminum housing, spring, and pilot, with the pilot forerunning the peening tool to hold the assembly rigidly against the rivet set, thus eliminating vibration and providing for accurate riveting.

How many holes in YOUR production could you plug with a good, all-purpose

FOOT PRESS?

Look around your shop. Figure the time and money you could save with one or more dependable FOOT PRESSES. Then write for Bulletin giving full specifications of FERRACUTE'S New Series FOOT PRESSES. Low in cost but backed by the famous FERRACUTE name.

For utility or production:—

Forming—
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New Series

FOOT PRESSES

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1-TON, 2-TON, 3-TON, PEDESTAL OR BENCH MODELS

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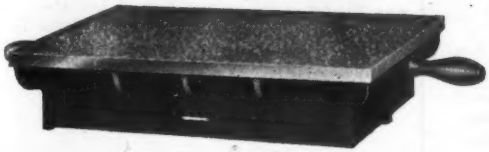
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Semi-Steel BENCH PLATES

Provide an accurate, rigid surface for inspection, layout and assembly. Depend on Challenge Bench Plates—made of special analysis semi-steel—all sides machined at right angles to the top. Precision ground—two, four, and six inches thick—wide range of sizes. Also available in planer finish. All plates have heavy ribs on the underside. Send for latest Challenge catalog containing complete information.

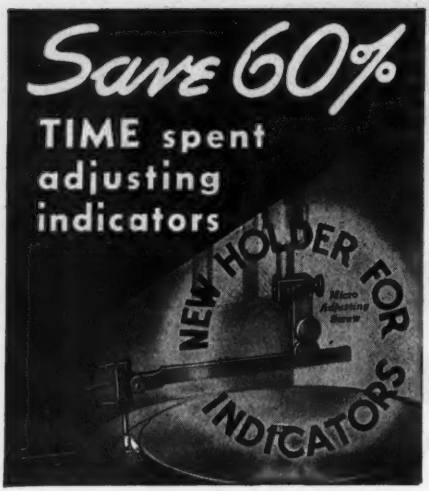
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SEMI-STEEL
SURFACE PLATES

A precision surface for tool making and inspection. Used as master plates for testing and checking purposes. Made of strong, close-grained semi-steel, specially treated to overcome strains in casting and machining and to avoid distortion after scraping. These plates have three-point suspension and heavy, deep ribs on the underside to form triangular supports. Hand-scraped or precision ground. Felt-lined wooden protective cover furnished with each plate. Write today for full details, including list of sizes and latest prices. 431

Challenge **THE CHALLENGE MACHINERY CO.**
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For Jigborers, Boring Mills, Milling Machines. It fits all popular indicators. The above illustration shown complete with extension bar.

NO more tiresome tapping your indicator into position. Now — after locking to approximate position, you obtain final setting by simply turning Micro Adjusting Screw. This exclusive time-saving feature of the OSLUND HOLDER for all popular indicators gives you ***complete control.*** Write today for details.



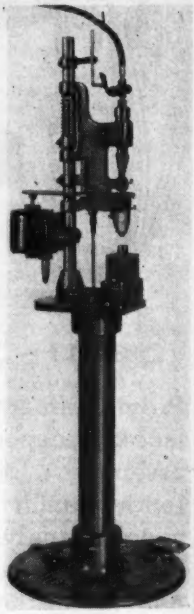
Another Time-Saver

This Holder produced by makers of Oslund Indicator — the shockproof, constantly accurate indicator, whose 360° dial is read from *all* sides. Write Oslund today.

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TOOL & DIE CO.
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Operating at 4,000 to 6,000 r.p.m., the Airflex Spinner Riveter heads round, oval, and flat head rivets, peens shafts, pins, and studs, and furls or swages shoulder bushings and light tubes to sheet metal or plastics. While rotating, the air-operated peening tool delivers short (¼-inch maximum) strokes in rapid successions. A ⅛ h. p. ball bearing type vertical motor with push-button control is used to provide the rotating motion to the peening tool, while the air is regulated by a petcock to adjust the force and frequency of the blows.



Airflex Spinner Riveter with Advance Pressure Pad

Frame travel of the machine is approximately 2 inches and the depth of throat is 5 inches. The frame has a maximum adjustment of 4 inches on post to accommodate various size of assemblies.

The Airflex Spinner Riveter is offered in three models—SP-75 ($\frac{3}{16}$-inch capacity), SP-100 ($\frac{1}{4}$-inch capacity), and SP ($\frac{5}{16}$-inch capacity).

Eisler Universal Resistance Welder

A water-cooled automatic press-type universal resistance welding machine of high capacity has been placed on the market by the Eisler Engineering Co., 740 S. 13th St., Newark 3, N. J. The machine is adaptable for circular and longitudinal seam welding and, by simple change of electrodes, for spot welding operations. The change from one to the other seam welding position is manually effected by loosening four nuts on the upper as well as lower turret holder and rotating and fixing each turret in position according to a matching



Foremen and superintendents constantly are being amazed at what can be done with RFC wheels and discs. Heartbreaking jobs become pushovers. Hours are saved daily . . . patience, too; while accuracy is held to highest standards.

RFC HAND-CUT ROTARY FILES include a full line of wheels and discs . . . popular among power tool users the country over. Some are made one-piece, others stem-fitted, and still others drilled or tapped to fit your spindle.

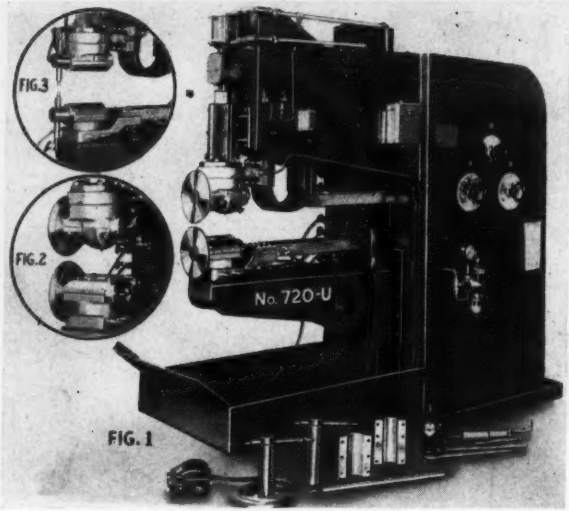
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The right steel, properly heat-treated . . . expert cutting to correct design and size . . . all are important. Remember, RFC specialists' 20 years of experience go into the manufacture of every RFC rotary file.

Investigate the new skills that RFC hand-cut rotary files have brought to thousands of plants. Catalog upon request.

The ROTARY FILE COMPANY
STRATFORD, CONN.

11



Eisler Universal Resistance Welder

notch which marks correct alignment.

Only the upper seam wheel is power driven, a 1 h.p. 1,425 r.p.m. motor being used for this purpose. A variable speed driving arrangement provides for speed reduction between the limits of ¾ r.p.m. minimum and 2¼ r.p.m. maximum, or a surface speed of 2 feet to 6 feet respectively with a 10-inch diameter seam wheel. This power transmission is only used for seam welding.

In either seam or spot welding, the upper electrode, attached to a large square ram sliding in a proper guide block, is actuated by a double-acting air cylinder. Electrode pressure is adjustable by an air pressure regulating valve. The air system includes an air filter, indicating pressure gage, and an automatic lubricator. The welding transformer is available in 100, 150, and 200-kva and larger sizes, 220 or 440 volts,

Hartford

"SUPERSPACER"

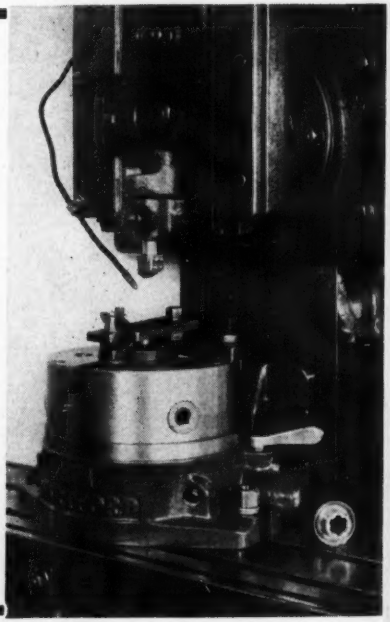
for Versatile Spacing

Very accurate multi-splines are being slotted in heat-treated steel in this illustration. A special holding fixture is mounted on the face of the chuck.

The HARTFORD "Superspacer" is more rigid and more rapid in operation than the conventional dividing head. It can easily be set up for one piece or thousands. Interchangeable mask plates make errors impossible on divisions of 2, 3, 4, 6, 8, 12, 24. Write for complete specifications and illustrations of milling, drilling, grinding, jig boring, planning, slotting and boring operations.

THE HARTFORD SPECIAL MACHINERY CO.

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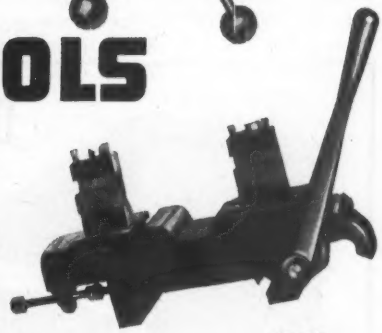
for QUICK change-overs



$197.50
Immediate
Delivery

UTILITY TOOLS

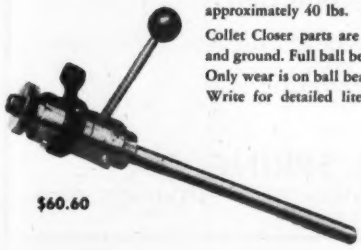
In a matter of minutes you can convert your engine lathes into screw machines. Simply remove tail stock and install a Utility Turret and Crossfeed Cut-off. Turret has rack and pinion which assures steady feed. Raised bearing surface eliminates all chip trouble. Has two taper gibs for take-up and alignment. All ways and bearing surfaces are ground. All inserts, bushings and pins are hardened and ground. Hex is 5⅛" across flat, 2-7/16" thick. Accommodates a ¾" hole or a No. 1 or 2 Morse taper. Fits Logan, South Bend, Atlas, Craftsman, 10" Sheldon, Clausing, etc.



$55.00

Cross Slide pictured here has rack and pinion, two tool holders with adjustable jacks. Weight approximately 40 lbs.

Collet Closer parts are hardened and ground. Full ball bearing. Only wear is on ball bearings. Write for detailed literature.



$60.60

UTILITY
TOOL and DIE MFRS.
1370 West Washington Blvd.
LOS ANGELES 7, CALIFORNIA

60 cycles, and provides for selection of numerous points of heat regulation by means of dial control.

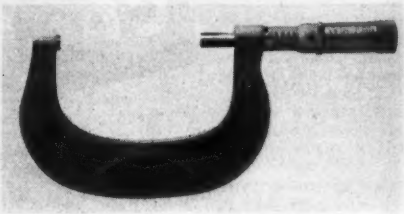
Completely automatic control of the entire system can be attained by connecting the unit with a mechanical or electronic contactor and welding timer. All accessories are mounted on a solid, completely arc-welded, box-type frame. The electrodes are made of wear resistant copper alloy of high electrical and thermal conductivity.

The special foot switch for starting the welding operation consists actually of a small and a larger treadle built into a single unit. Initial depression of the large foot pedal energizes the solenoid-operated air valve, admitting compressed air to air cylinder and thereby lowering the upper electrode. Further depression of both treadles together closes the electrical circuit to the timing equipment.

The 100-kva machine is 88 inches high overall, 93 inches long overall, 47 inches wide overall, and weigh 6,200 lb. In the accompanying illustration, Figs. 1 and 2 show the Eisler Universal Resistance Welder arranged for circular and longitudinal seam welding respectively and Fig. 3, for spot welding.

Reed Micrometers with 0.0001-Inch Verniers

With blueprints today more and more calling for measurements to tenths of thousandths, the George Scherr Co., Inc., 130 Lafayette St., New York 13, N. Y., announces that henceforth all Reed Micrometers in the 1, 2, and 3-inch sizes will be furnished with a vernier enabling quick and easy readings to one-ten-thousandth of an inch. There will be no extra charge for this added feature.



Reed 3-Inch Micrometer with 0.0001-Inch Vernier



OPEN END PILING BOXES

NOW AVAILABLE FOR PRODUCTION USE

These boxes can now be furnished to defense plants for handling of parts in production and assembly, where used as portable containers.

THE CLEVELAND WIRE SPRING CO.

5250 Brookpark Road — Sheet Metal Division — CLEVELAND, OHIO

What do you expect of a Cutting Tool?



STYLE 11

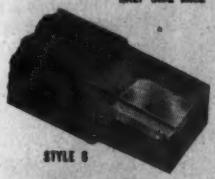
KENNAMETAL WILL GIVE IT TO YOU *and More!*



STYLE 3



HALF SIDE MILL



STYLE 6



SPECIAL MILLS

Would you like to double cutting speeds so as to step up production? With KENNAMETAL, increases of 300 to 500% over high speed steel tools, and 50 to 100% over ordinary carbides are common.

Would you like to eliminate snagging and clean up operations now required before machining because of hard scale or flashing? KENNAMETAL tools will cut through sand pockets, hard spots, and tough scale.

Do you want to avoid the necessity for two cuts, roughing and finishing? With KENNAMETAL it is possible to take heavy cuts and still leave a clean, true surface.

Do you want to eliminate grinding operations? KENNAMETAL tools will machine to a smooth finish and accurate size from end to end even on long parts such as shafts and gun barrels.

Would you like to "gang up" several parts to save machining time, but hesitate because of the interrupted cuts involved? KENNAMETAL tools are sturdy and will take such jobs in stride.

Many plants are now taking advantage of these possibilities by using KENNAMETAL with its high hardness, extreme wear-resistance, and shock-resistance. You, too, can benefit by using the distinctive KENNAMETAL tools. There is a type and size for every carbide application, be it turning, facing, boring, or milling. Each tool produces consistently good performance throughout its scope of applicability.

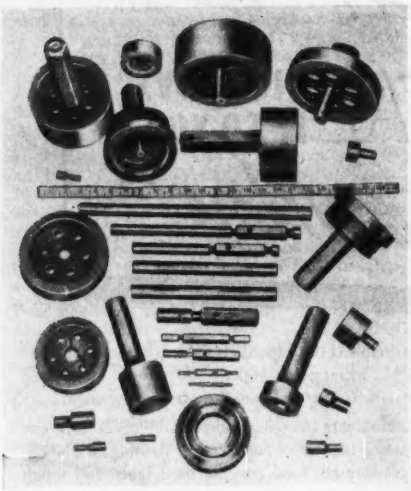
These are listed and described in our latest Catalog 43C. Do you have your copy?

KENNAMETAL *Inc.*

300 LLOYD AVE., LATROBE, PA.

Trade Mark Reg. U. S. Pat. Off.

GAGES



In 48 Hours

(IN MANY SIZES)

Plug gages, rings, snaps. All degrees of accuracy. Very little ones .030" dia. Also big ones up to 8" dia.— Special gages.

EASTERN PRECISION GAGE CO.

125 Broad St. Elizabeth, N. J.

Phone, Elizabeth 2-9519

We operate night and day and Sunday. Phone us at any hour. Phone, Elizabeth 2-9519.

The accompanying illustration shows a Reed 3-Inch Micrometer with 0.0001-inch vernier.

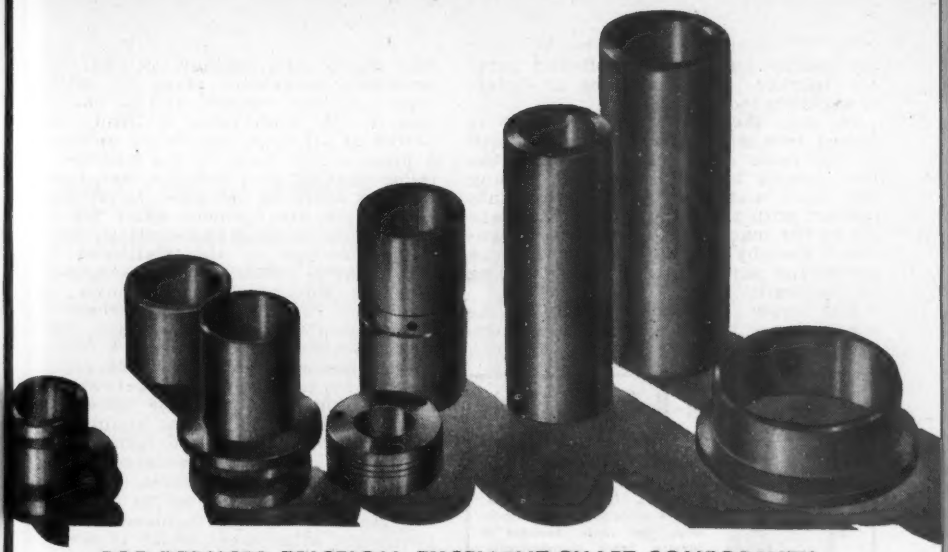
Matthews No. 204 General Purpose Hand-Operated Marking Machine

Developed by Jas. H. Matthews & Co., 3944 Forbes St., Pittsburgh, Pa., the Matthews No. 204 General Purpose



Matthews No. 204 General Purpose Hand-Operated Marking Machine

Hand-Operated Marking Machine shown here is designed for the clear-cut, legible marking of part numbers, patent numbers, names, coding, trade marks, special lettering, designs, and so on, on a variety of parts up to 6 inches in diameter or thickness. Flat parts are legibly marked by means of solid roller dies on mortised roller dies and inter-



FOR REDUCED FRICTION, EXCELLENT SHAFT CONFORMITY, AND QUALITIES OF SELF-LUBRICATION, SELECT . . .

BUCKEYE *Lubrico* BEARINGS

. . . The exceptional quality high lead bearing that resists pounding and heavy shock, yet costs but little more than standard analysis bearings

For precision airplane parts, pumps, seal rings, high speed shafts and other services where freedom from shaft scoring and seizure are desired, specify "Buckeye Lubrico."

Manufactured from selected metals under Buckeye's exacting laboratory and metallurgical control assures the production of sound homogeneous bearings having a thorough and uniform dispersement of lead throughout. These bearings are free from porosity and are accurately dimensioned within the required limits assuring speedy, easy assembly.

Buckeye Lubrico Bearings can be furnished in any of our 1088 standard stock sizes—in 13" cored or solid bars —or in any OD, ID and length, slotted, drilled, flanged or threaded exactly to customer's blue print . . . in three different metal analyses to meet exactly the requirements of light high speed, general, and extremely heavy duty service. No order is too big or too small for Buckeye. Let us quote on your requirements.

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BRASS AND MANUFACTURING COMPANY

BRONZESMITHS SINCE 1900

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BRONZE SLEEVE BEARINGS · STANDARD SIZES OR TO CUSTOMERS' BLUEPRINT IN ANY RECOGNIZED BEARING METAL ANALYSIS

changeable segment type. Round parts are marked with flat dies or interchangeable steel type.

In use, the part to be marked is placed into a suitable fixture fastened to the table of the machine, and the foot treadle is depressed, thus raising the table and bringing the part into contact with the marking die. The handle of the machine is then pulled downward, thereby causing the die to move across the part and thus legibly rolling in the mark.

The upper and lower parts of the machine are separate, sturdy castings. The top of the machine is flat, thus providing convenient place for setting type box, lock wrench, and so on. The ram of the work table is firmly supported at all table heights by means of a plate on the front of the machine. A roller bearing provides for free movement of marking die slide. Bevel gears and toggle arrangement allow for use of minimum pressure in operating treadle.

Specifications of the Matthews No. 204 General Purpose Hand-Operated Marking Machine are as follows: die stroke on round parts, 3½ inches; die stroke on flat parts, 4½ inches; table rise, 7 inches; table size, 9 x 8 inches; throat (center of die to front of uprights), 3½ inches; opening between uprights, 8 inches; height of table from floor, maximum 43 inches, minimum 36 inches; floor space, 19 x 20 inches; overall height, 52 inches; weight, 500 lb.; shipping weight, 600 pounds.

If desired, the Matthews No. 204 Marking Machine can be furnished with a pneumatic attachment which is particularly recommended for use in the marking of uneven surfaces having a variance of up to ⅛ inch in diameter or thickness. The machine is also available with a motorized unit which can be substituted for the standard head.



M-D Facing Heads

With Automatic Feed

Can be attached to Boring Mill Bar, and Drilling or Milling Machine spindles. Single point tool travels radially, from center outward or reverse, feeds automatically. Sizes 6" to 46" diameter.

Write for circular.

MUMMERT-DIXON CO.

120 PHILADELPHIA ST. HANOVER, PA.



Model P-30 V

Penrod Centrifugal Coolant Pumps

MODEL P-30 V PUMPS ARE EASILY APPLIED TO GRINDERS, MILLING MACHINES, LATHES, DRILL PRESSES, SCREW MACHINES, ETC.

Model P-30 V Pumps are for submerging into the Coolant Reservoir. They are especially suitable for use with coolants containing abrasives or small chips.

This pump is easily installed on old or new machines and is ample enough to handle single or multiple installations. Model P-30 V-⅛ will pump up to 1200 G. P. H. and Model P-30 V-¼ up to 2400 G. P. H.

Tank built especially for Model P-30 V-⅛ Pump can be supplied promptly. Made from heavy sheet steel and containing built in baffle to collect chips. Lid is hinged to facilitate cleaning of tank and can be opened or removed without disconnecting return pipe fittings.

Model P-30-V Pumps are ready for immediate delivery. Phone or wire us for details.



All PENROD pumps have heavy-duty, std. construction NEMA motors.

Manufacturers of Machine Tool Coolant Pumps for years.

FLOYD PENROD & SONS
TOOL & ENGINEERING COMPANY

P. O. BOX 909 Phone 8571 MUNCIE, INDIANA

JACOBS CHUCKS

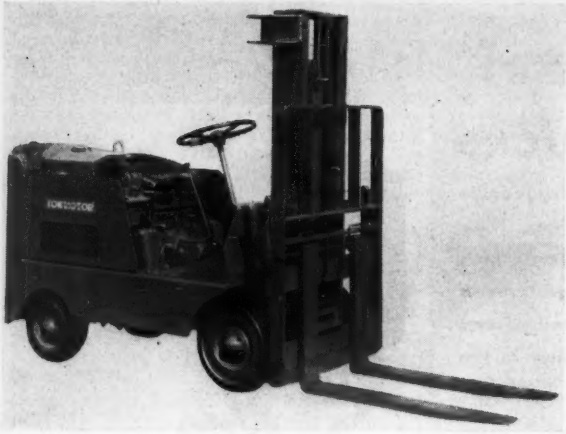
are designed and built for ruggedness and unsurpassed holding power. Their application to literally thousands upon thousands of munitions and precise aircraft jobs has contributed — and still contributes — to Efficiency in the war production program.



The Jacobs Mfg. Co. Hartford, Conn.

O.W.I. Photo

E NATIONAL STANDARD *for War Production*



Towmotor Standard Lift Truck Equipped with Back Rest Extension

Back Rest Extension for Towmotor Standard Lift Truck

To facilitate the handling of unusually high stacks of bags, drums, bales, boxes, and other small bulky units, the Towmotor Corp, 1226 E. 152nd Street, Cleveland, Ohio, has developed an extension for the lifting carriage back rest of its standard lift truck. Of all-steel all-welded construction, the extension can be quickly attached by inserting the permanently attached pins into sockets welded to the standard lifting carriage. Thus held firmly in position, the extension is said to greatly increase the support area afforded by the standard back rest of the lifting carriage and to enable multi-unit loads of unusual height to be handled with normal stability and safety.

The extension shown in the accom-

SHEARS CIRCLES! CURVES! ODD SHAPES!

Whichever you want, a straight cut or irregular curve—it's as easy on the inside as the outside, on either flat sheets or formed work. No starting holes needed for an inside cut. A Libert is easy to operate—foot pedal control allows use of both hands to guide work at all times. It shears cleanly! Edges are *smooth;* need no further finishing. *Write for Bulletin.*

Made in sizes up to 60-in. throat, 10-gauge capacity

Libert Hi-Speed SHEAR 2-H-43



MODEL 1236 36-In. Throat 12-Gauge Capacity

CIRCLE CUTTING ATTACHMENT Included as Standard Equipment With This Machine

LIBERT MACHINE COMPANY, Green Bay, Wisconsin

USE BLANCHARD WHEELS ON BLANCHARD GRINDERS

MATERIAL
Cast Iron

WHEEL
30C30 Segment

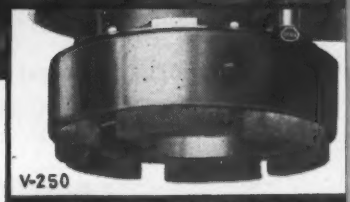
FINISH
Good Commercial

LIMITS
Flat .004"

PRODUCTION
8 pieces per hour
2 sides 1/16" stock



Cast Iron Saw Tables Ground on No. 18 Blanchard Surface Grinder.



Blanchard SEGMENT Wheel

The cast iron saw table shown above is ground from a rough iron casting. Regardless of the thin section of this casting the broad table surface is flat within .004"

Blanchard will welcome the opportunity to help you achieve similar results with Blanchard Wheels on your Blanchard Grinders. In writing, give us complete information about the job — send us blueprint or dimension sketch of the work. Give the name of material — how much stock is removed — how many pieces are chucked at one time — chuck speed — what feed used — finish required, and limits to which work is held.

Write today!



The Booklet "Blanchard Wheels" contains helpful information on the selection of grinding wheels for all kinds of work—sent free on request.



The **BLANCHARD** MACHINE COMPANY
64 STATE STREET, CAMBRIDGE, MASSACHUSETTS



"Because

SPEEDI-DRI

has done such a splendid job, we have never used anything else,"

writes

Walter Gilby, Personnel Manager,
DRIVER-HARRIS COMPANY
Harrison, N. J.

"Since using SPEEDI-DRI our floors have been kept clean. We have also eliminated the hazards of fire and slipping. The two men who used to spend all their time cleaning our concrete floors have been given other work to do.

The hundreds of letters in our files praising SPEEDI-DRI performance are convincing testimony of the effectiveness of this product. Here are brief excerpts from other letters: "It soaks up oil and grease like a sponge." "It brightens up the whole plant." "It has reduced our cleaning costs." "It has prevented many slipping accidents and enabled us to reduce insurance rates." "It has improved our employee morale — especially among our women workers."

SAVE VITAL MAN-POWER

A product that can do all that and that costs as little as SPEEDI-DRI, deserves a trial in *your* plant. Write for a free sample.



SPEEDI-DRI
OIL AND GREASE ABSORBENT

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SUPPLIERS

East — **REFINERS LUBRICATING CO.**
New York 1, N. Y.

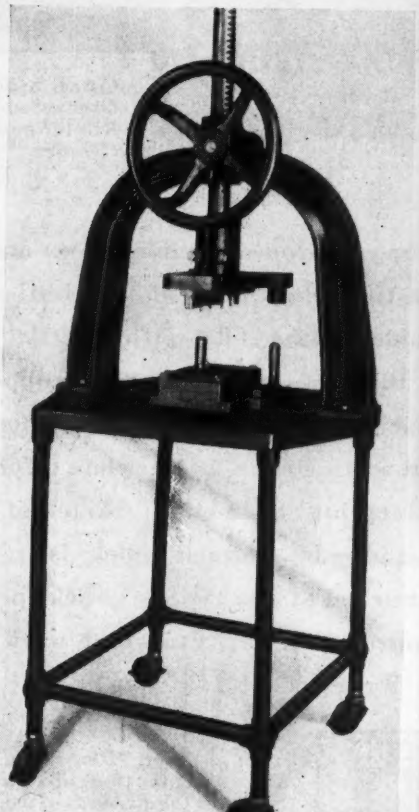
Midwest and South
WAVERLY PETROLEUM PRODUCTS CO.
Philadelphia 6, Pa.

West Coast
WAVERLY PETROLEUM PRODUCTS CO.
Russ Building, San Francisco 4, Calif.

panying illustration extends 60 inches above the surfaces of the lifting forks. Other models increasing carriage back rest height from 48 to 72 inches above forks are available to meet individual requirements.

Lacey Portable Die-Set Machine

Marketed by the Moore Special Tool Co., Inc., 740 Union Ave., Bridgeport 7, Conn., the Lacey Portable Die-Set Machine illustrated herewith is designed to enable the diemaker to complete a die-set by himself, right at his own bench. With the die shoe clamped to



Lacey Portable Die-Set Machine



Sleek and deadly, these hurtling bolts of destruction carry the white stars of liberty victorious among our enemies . . . formed and shaped to perfection by Tool and Die Steels of top quality!

*The Navy's new Vought-Sikorsky *Corsair*—one of the most potent fighters in the world. Inverted gull wings; 2000 H.P.; maximum speed, over 400 m.p.h.

Vanadium-Alloys
STEEL CO. LATROBE PA.

the table and the punch holder fixed in position in the ram, the punch can be removed as often as necessary without disturbing alignment.

Of sturdy open construction, the machine is said to assure positive, sensitive alignment at all times. It can be operated with one hand and is readily portable with the die shoe in place. Rigidly designed for fitting up heavy die-sets, the unit is also said to be useful for shearing in certain types of punches.

The stand is constructed of heavy pipe and is equipped with ball bearing casters. The table consists of extra heavy steel plate, smoothly planed. The yokes are semi-steel normalized castings of ample proportions to eliminate deflection. The punch-holding device consists of a split bushing with 2½-inch bore to accommodate standard or bushed smaller punch shanks. The ram is made so that it can be readily maintained at any desired position by means of a ratchet and safety stop.

Specifications of the Lacey Portable Die-Set Machine are as follows: size of work table front to back, 24⅞ inches; distance between uprights, 22½ inches; distance top of work table to bottom of shank holder on rack, 15 inches; diameter of rack, 2 inches; diameter of handwheel, 18 inches; height top of table to floor, 30 inches; total weight, 300 pounds.



Pratt & Whitney Air-O-Limit Gage

Especially designed to check lead-indium plated aircraft engine bearings for errors in straightness, roundness, and size, a high speed gage to be known as the Air-O-Limit has been developed



L-W HIGH SPEED POWER HACK SAWS

Quality at Low Cost

IMPROVED DESIGN — HEAVY DUTY — FAST CUTTING. A REAL SAW THAT WILL SAVE YOU TIME AND MONEY.

To start cut, relieve weight of saw frame, hold down on release lever and lower saw to work—start machine. Automatic trip stops the machine on completion of cut. Automatic relief of saw blade on the non-cutting stroke is also provided.

Capacity 6"x6" with 10" to 14" blades — Clutch Pulley 12"x3" — Speed of Pulley 120 r. p. m. **IMMEDIATE DELIVERY**



ONLY
$180.15

Motor Drive Arrangement
$25.90 Additional

L-W CHUCK CO.

20 N. ST. CLAIR ST. TOLEDO, OHIO

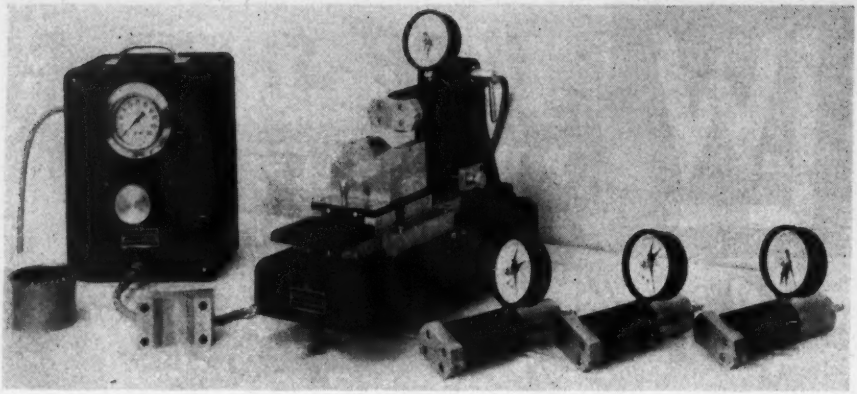


Illustration showing Pratt & Whitney Air-O-Limit Gage together with three extra gaging spindles and extra V-block

by Pratt & Whitney, Division Niles-Bement-Pond Co., West Hartford, Conn. The gage is constructed so as to check holes without actually contacting inside diameters, thus eliminating possibility of scratching or burnishing hole surfaces regardless of their softness. The particular gage illustrated has gaging spindles for inspecting diameters from 2 to 5 inches, however, a small model gage is available which can be used in checking bores that are as small as ½

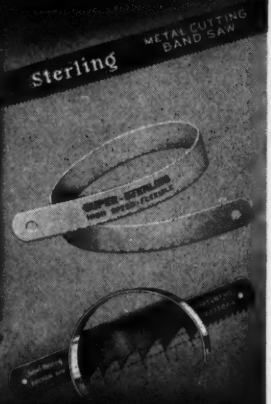
Super-Sterling Saws

The Broach Saw

America's revolutionary hand and power hack saw. Each succeeding tooth is larger, producing a "generating cutting action." This high speed steel blade

CUTS METAL FASTER

Starts free and easy; cuts fast and straight; won't stick or chatter. This is a patented blade exclusive with SUPER-STERLING so in ordering through your mill supply house specify the SUPER - STERLING BROACH SAW.



They don't scratch, they cut!

DIAMOND SAW WORKS, INC.
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GET BIG PRODUCTION FROM UNSKILLED WORKERS!

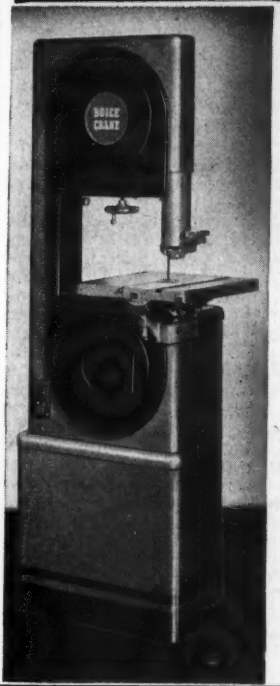
Every dollar invested in

BOICE-CRANE POWER TOOLS

SAFETY-ENGINEERED
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does the work of two spent on oversize machines

You can get QUICK DELIVERY from Boice-Crane



A TIME AND MONEY SAVER IN ANY PLANT

BOICE-CRANE MODEL 2300, 14" SAFE, STEEL CLAD BAND SAW

For cutting metals, wood, plastic and paper. Cuts stock 8⅝" thick and handles 27" diameter work. Accurate blade tension scale.

Entire frame work is a single, one-piece steel structure. Wheels made of strong, light weight materials for exceptionally vibrationless and quiet operation. Wheel guards swing on hinges and must be closed before machine can be operated.

Telescoping blade guard holds by friction when lock handle is released. It will not drop while adjusting.

Tool and die makers will appreciate our new blade guide design. These guides handle blades from ⅛" to ¾" without trouble, and are adjusted by a convenient single knob control.

The table is 15" x 15½" and is rigidly supported on two large trunnions—no portion can sag under heavy cuts. Table tilts 45° to right—10° to left—degree of tilt indicated by convenient scale.

8 speeds . . . one to suit every kind of blade and efficiently saw every kind of material. Heavy duty gears transmit as much as one horse power at lowest speed with a wide margin of safety. All gears run in oil.

On floor model everything including motor is fully enclosed and sealed against dust and grime—no exposed moving parts. Given top rating by State Safety Commissions.

Also available in bench model.

A battery of 6 to 10 Boice-Crane Saws cost no more than some single machines of big size.

BOICE-CRANE OSCILLATING SPINDLE SANDER

Rapid production. Uses smallest diameter abrasive sleeve of any low priced spindle sander. Sands any degree of bevel up to 6 inches in height. Large, tilting work table.

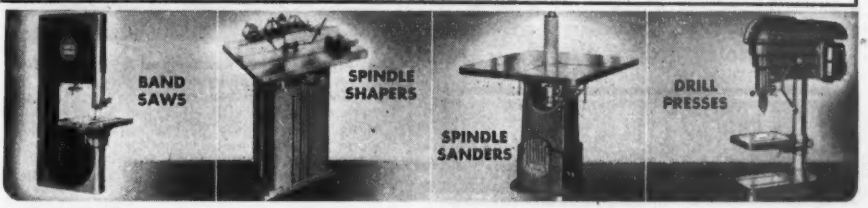
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Send us your damaged tap extractors. All broken holders, collars and sleeves will be replaced without charge. Steel fingers replaced at standard list prices. Put your Waltons in condition now. Idle tools cost you money.



No annealing

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Immediate Shipment. Stock sizes No. 4 to 1½", 2, 3, 4 flutes. 30 day free trial.

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The WALTON Company
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inch in diameter.

Principal components of the Pratt & Whitney Air-O-Limit Gage are the gaging fixture, gaging unit, and air-supply equipment. The gaging fixture serves as a means for mounting the gaging unit and a ball-supported work carriage that positions the part over the gage plug. Two V-type anvils with tungsten carbide inserts are fastened to the carriage. The one nearest the operator is permanently mounted to receive master ring gages for setting up the instrument, while the other accommodates the work. All master ring gages are of the same external diameter, and the internal diameter is made concentric with the outside diameter to close limits.

One gaging unit is usually sufficient for checking a bearing both before and after lead-indium plating, since the indicator is usually calibrated with a 0.004-inch scale which is sufficient for the tolerances involved. To make a new setup, the work anvil is exchanged by removing four socket cap screws and mounting the new anvil on a tongue in the base of the carriage. The gaging unit is held in the column by a clamp screw and can be readily interchanged.

The air-control cabinet contains a filter unit for removing moisture and foreign matter from air taken from the shop line. The air passes from the filter to the first pressure-reducing valve where it is stepped down to 50 lb. per square inch. Next, the air passes to a second adjustable pressure valve for a further reduction to 30 to 40 lb. per square inch for operating the gaging unit. The valve contains a mechanical adjustment for accurate zero setting of the gage indicator. The low pressure is read on a meter in the face of the air-control cabinet.

The filtered and regulated compressed air from the air-control cabinet is fed into the rear of the gaging unit, which is clamped to the column of the gaging

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WHEELS AND POINTS

The World's Best Rubberized abrasives for Fine Grinding and Polishing

Attach this advertisement to your card or letterhead. We will send you a *free* trial sample. Or if you prefer send $1.00 for Special 33 wheel assortment.

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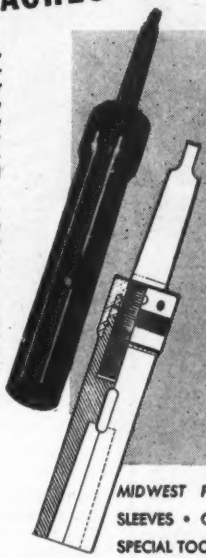


MULTIPLE SPINDLE SET-UPS AND HEADACHES OFTEN GO TOGETHER

Misaligned tools, excessive set-up time, inexperienced help and complicated adjusting mechanisms on tool holders or holders that do not provide accurate micrometer adjustments—these are some of the headaches which often accompany multiple spindle set-ups. They are obstacles to securing accurate work and maximum production.

Midwest Adjustable Extension Tool Holders were designed for multiple spindle production jobs. They provide a simple to operate, yet a micrometer accurate adjustment to compensate for unequal tool wear and for variations in tool length. The adjustable feature reduces set-up time and makes the axial position of all the tools on the job accurate. With these holders it is possible to drill, tap, counterbore or ream to various depths or use tools of unequal lengths.

- **ADJUSTMENTS CAN BE MADE IN STEPS OF .001 OF AN INCH.**
- **OPERATOR CAN MAKE ADJUSTMENTS BY HAND —NO TOOLS NEEDED.**
- **SET-UP TIME IS REDUCED.**
- **DESIGN IS SIMPLE, CONSTRUCTION RUGGED, ALIGNMENT ACCURATE.**



HERE'S HOW THEY WORK

Midwest holders are provided with an extremely accurate, ground fit between the sleeve and the shank. A knurled, graduated collar which controls the adjustment is located at the top of the sleeve. A key fixed in the sleeve with a sliding fit to a keyway in the shank provide a positive drive.

Micrometer, longitudinal adjustment steps of .001 of an inch are made by turning the collar one space on the bevelled edge, graduated scale. The collar holds firmly at all positions of the scale. There are no screws or locknuts to give trouble and, without tools of any kind, the operator can easily make the adjustment by hand.

MIDWEST PRODUCTS INCLUDE—MILLING CUTTERS • SLEEVES • COUNTERBORES • END MILLS • REAMERS • SPECIAL TOOLS • FORM TOOLS • CARBIDE TIPPED TOOLS • ADJUSTABLE HOLDERS.



MIDWEST TOOL & MFG. CO.
2366 W. Jefferson Ave. Detroit 16, Mich.

MIDWEST

HEAVY BEVEL



SAFETY (Reg. Trade Mark)
LETTERS and FIGURES

Deeper, clear impressions. Will not spall, will not mushroom. Any size character from 1/32" up.

M.E. CUNNINGHAM CO.
SAFETY STEEL STAMPS
158 E. Carson St., Pittsburgh, Pa.

Need an Extra Hand?

Transfer Points Insure Accurate Layouts In Die Making

A real helping hand! Heimann Transfer Screws are quick, accurate markers in setting dies. No wrench needed. Six hardened screws nested in holder (see below). Uniform height hex base to point, insuring clear uniform indentations.

Send for circular.

PRICES Per Set	
3/16"	$1.50
1/4"	1.20
5/16"	1.25
3/8"	1.35
7/16"	1.40
1/2"	1.50

All U.S.F. Also S.A.E.

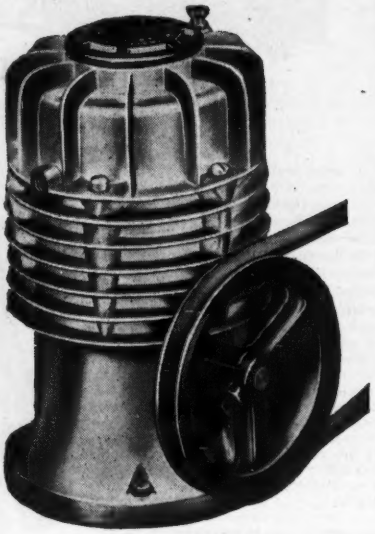


HEIMANN MFG. CO.,
URBANA, OHIO

fixture. Here the air passes through a restriction tube and thence to two orifices placed on opposite side of the gage plug. The clearance between each orifice and the adjacent bearing wall is usually 0.003 inch. The air gap so created restricts free flow of air from the orifices, and the back pressure is calibrated in terms of tenths on the indicator dial. Use of two orifices permits a spot reading at any plane. Consequently, out-of-roundness is detected by rotating the bearing and taper by traversing the work carriage.

Brown Air Compressor

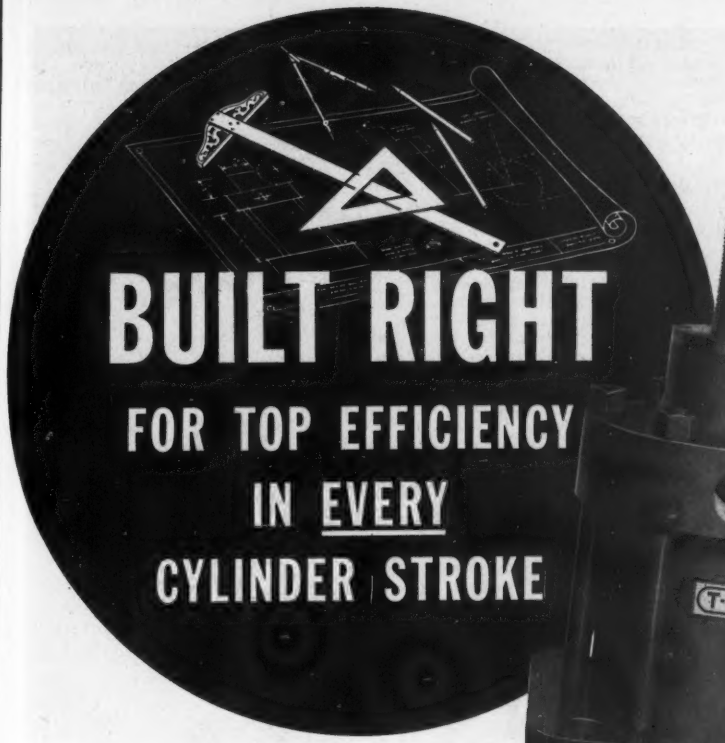
Designed for installation on equipment and machinery requiring compression or vacuum, a powerful air compressor of



Brown Air Compressor

compact, lightweight construction has been placed on the market by the W. R. Brown Corp., 5725 Armitage Ave., Chicago, Ill. The compressor is said to deliver 2 cubic feet of free air per minute at pressures up to 45 lb. and to produce vacuums up to 25 inches.

Constructed so as to reduce vibration and noise to a minimum, the Brown Air Compressor is equipped with sealed type precision ball bearings and long-



BUILT RIGHT

FOR TOP EFFICIENCY IN EVERY CYLINDER STROKE

T-J AIR AND HYDRAULIC CYLINDERS are *accurately machined* to assure *right* mounting and highly efficient performance. The mounting surfaces are parallel with (or at right angles to) the bore of the cylinder. All surfaces are strictly inspected for squareness and smoothness. All mounting holes are drilled—not just cored. T-J engineering and experienced workmanship assure *maximum power movement*...long dependability. Write for latest catalogs on T-J Cylinders. The Tomkins-Johnson Co., Jackson, Mich.

HYDRAULIC CYLINDERS. In standard capacities in eight standard styles. Two models, one for 750 lbs. pressure p.s.i. and one for 1500 lbs. p.s.i. In Cushioned and Non-Cushioned types.

AIR CYLINDERS. In all standard sizes and in seven standard styles. Cushioned and Non-Cushioned types.

FOR TOUGH JOBS...SPECIFY T-J

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RIVITORS...AIR AND HYDRAULIC CYLINDERS...CUTTERS...CLINCHORS

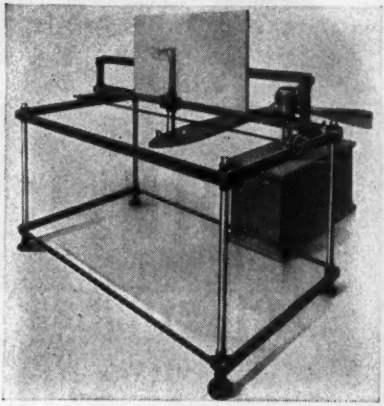
life, multiple ply diaphragms which are said to assure clean, oil free air at all times. The compressor, which is 9½ inches high overall x 6 inches in diameter, is designed to operate in any position and requires ¼ h.p. input.

Inter-Lakes "Dupligraph"

A device which makes it possible to ascertain the exact contour of irregular surfaces in a fraction of the time required by the former laborious method of cutting and fitting wood templates has been placed on the market by Inter-Lakes Engineering Co., 502 Transportation Bldg., Detroit 26, Mich. The device, which is known as the "Dupligraph," transfers on transparent paper the exact contour of the irregular object, such as the propeller blade shown in the accompanying illustration. It will also transcribe the contour directly on metal.

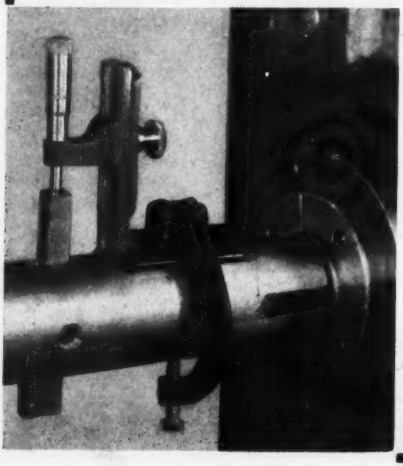
Use of the Dupligraph is said to be particularly advantageous for obtaining concave readings in forming dies which frequently cannot be checked with ordinary templates. It also solves the problem of obtaining a true reading of a stamping, showing the amount of springback and warp.

In the manufacture of products which require the close following of models, the Dupligraph replaces the inspector's time, since it gives cross-section lines



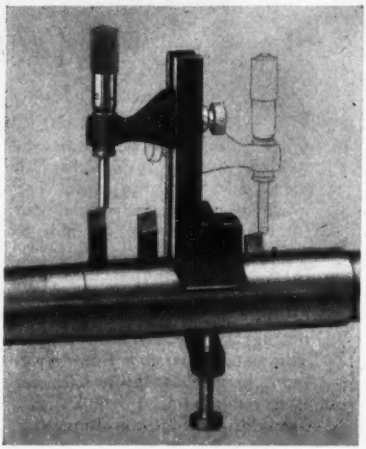
Inter-Lakes "Dupligraph"

BARTELT
PEDESTAL MICROMETERS
formerly called Bartelt Tool Setting Gage



MODEL "A"

MODEL "B"



★ These handy, practical gages will speed up boring work and help to produce accurate results more easily. Green hands are aided toward becoming good workmen more quickly. Available in two models, as shown. Three clamps furnished, to fit all boring bars from 1" to 5" dia.

BARTELT ENGINEERING COMPANY
1216 PARTRIDGE AVE. BELOIT, WIS.



Flexibility IS NECESSARY IN A MAINTENANCE SHOP

The accurate heat treating of production equipment such as turning tools, milling cutters, taps and other special tools and fixtures, plays an important part in keeping production at a high level. The Rock Island Railroad, at their Silvis Maintenance Shop, use three Hevi-Duty Box Furnaces for these varied heat treating operations — Railroads need flexibility in their maintenance shops.

Send for Bulletins HD-341 and HD-441

HEVI DUTY ELECTRIC COMPANY

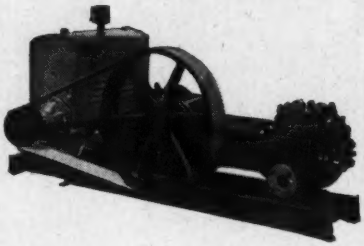
HEAT TREATING FURNACES HEVI DUTY ELECTRIC EXCLUSIVELY

MILWAUKEE, WISCONSIN

relative to each other. This is usually done on vellum and checked against the draft or layout. The result is a full contour line as compared with only a spot dimensional check by the former method.

McGowan Duplex Side Pot Power Pump

Manufactured by the McGowan Pump Division, Leyman Mfg. Corp., 7 Central Ave., Cincinnati, Ohio, the McGowan Duplex Side Pot Power Pump illustrated herewith is designed for general use in oil, steel, synthetic rubber, and related industries. Sturdily built, the pump features a 1,000-lb. working pressure, totally enclosed construction for moving parts, herringbone gears, and Timken roller bearings. The unit has a flanged suction connection on either side and double shaft extension. Bearing housings are extremely large to allow for easy maintenance.



McGowan Duplex Side Pot Power Pump

According to the manufacturer, the

"ALNOR" Velometer



An All Purpose Air Velocity Meter---Instantaneous, Direct Reading.

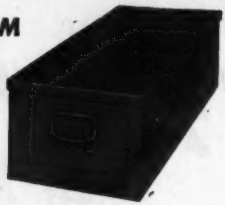
Measures total and static pressures as well as velocities.

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153 W. Austin, Chicago

STEEL STACKING BOXES *TOP RIM*

18" x 12" x 6" — 16 Ga.
with drop handles..... $1.27



IMMEDIATE SHIPMENT

STANDARD SIZES

18 x 12 x 6 . . . 16 Ga.
18 x 12 x 8 . . . 16 Ga.
16 x 10 x 6 . . . 18 Ga.
16 x 10 x 6 . . . 16 Ga.

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BENCH LEGS
Four sizes. All Welded.
Olive Green enamel.

BENCH TOPS
Steel and wood with or without drawers.

Literature on request.

STERLING
FACTORY EQUIPMENT CO

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PROVIDENCE, R. I.



How to Order

SHEFFIELD THREAD ROLL-SNAP GAGES

In ordering Thread ROLL-SNAP Gages be sure to state: 1. Style • 2. Major or outside diameter • 3. Pitch or threads per inch • 4. Pitch diameter of the GO and NOT GO rolls • 5. Complete marking instructions.

Sheffield Thread ROLL-SNAP will be set and sealed before shipment when Setting Plugs are included in the order. Otherwise, Thread ROLL-SNAP Gages will not be set at the factory unless the customer furnishes proper setting gages, except in the cases of standard specifications from No. 4 to 1½", NF-2, NF-3, NC-2 and NC-3. • In all cases, however, the limits will be stamped on the gage marking ring.

Write for descriptive bulletin No. G662-143

Manufactured Under Patents Nos. 1,660,335; 1,851 283; 1,930,558

SHEFFIELD MASTER CRAFTSMEN

THE SHEFFIELD CORPORATION

Dayton 1, Ohio, U.S.A.

MACHINE TOOLS — GAGES — MEASURING INSTRUMENTS — CONTRACT SERVICES

"ALL-WAY" LEVEL



The FELL Precision Level is made to show the level of all ways at once. This eliminates disturbing the first level when leveling the second. Graduations are in .0005" per foot and form squares about a circular bubble, thus giving co-ordinate readings and showing direction and amount of slope, if any.

MADE IN TWO SIZES
5½" x 12" 3½" x 6"
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702 SOUTH ST. ROCKFORD, ILL.

Counterbores
High Speed
Back Spot Facers
Core Drills
Flue Sheet Cutters

Interchangeable and Solids Also Specials

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BICKNELL - THOMAS COMPANY
GREENFIELD • MASSACHUSETTS

McGowan Duplex Side Pot Power Pump is easy to assemble or disassemble. Interchangeable liners provide for optional capacities and pressures.

Sheffield Electrigage

A unit for precision measuring of both internal and external dimensions



Sheffield Electrigage

held to very close tolerances, to be known as the Electrigage, has been developed by The Sheffield Corp., Dayton 1, Ohio. As an internal dimension comparator, the unit can be used for checking master and working ring gages, for setting up snap and length gages, and for other similar high precision work. It is designed to check diameters or other internal dimensions from ¾ to 12

Eliminate

INCREASE PRODUCTION THRU
INSTALLATION OF A BERKELEY DRIVE

ESPECIALLY DESIGNED TO FIT ANY MACHINE TOOL

Manpower is one of the principle worries right now. One of the ways of licking this problem is by raising manpower efficiency. A short cut to this end is by more efficient application of the hp to machine tools.

Berkeley drives provide more effective operating speeds. They permit you to make the most effective use of modern carbide tooling. With Berkeley drives, designed specifically for your machine tools, you can step up the tempo of war production without increasing your operating force.

Berkeley drives are made by a pioneer specialist in machine tool drives. There's a type and size for almost every machine tool. They will pay for themselves promptly through the operating savings which they make possible.

Let our engineering department submit recommendations for your machine tools, without any obligation to you. Our new bulletin gives full details.



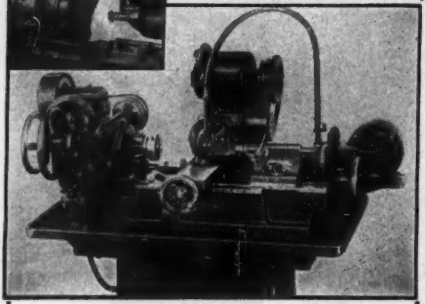


BERKELEY EQUIPMENT COMPANY

1022 BAHLS STREET - DANVILLE, ILLINOIS



For Threading Small Parts



The WALTHAM Thread Miller will cut V, N.S., Acme, Whitworth and Metric threads, special threads . . . up to 2" diameter. (Insert above shows special head for internal threading.) Special head for relieving can also be furnished.

Write for new bulletin No. M.

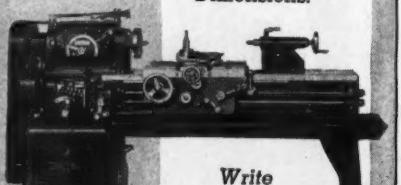
WALTHAM MACHINE WORKS, Waltham, Mass.

Also Small Milling Cutters, Sub Presses, Pinion and Gear Cutting Machines.

CARROLL AND JAMIESON LATHES 15" AND 16"

12 Speed Geared Head Motor Drive Timken Mounted Spindle.

Modern Design—Liberal Dimensions.



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THE CARROLL & JAMIESON MACHINE TOOL CO.

BATAVIA OHIO, U. S. A.

inches and gage holes to a depth of 3 inches. According to the manufacturer, taper, bellmouth, and out-of-round conditions can be readily discovered and measured with the unit. When used as external comparator, the Electrigage will check round, straight, and tapered surfaces within a maximum dimension of 12 inches.

The gaging arms are raised and lowered by an electrical mechanism operated by two push buttons. Automatic stops prevent the arms from raising or lowering beyond 3-inch range limits. A direct-reading visual counter, graduated in hundredths of an inch, serves as an automatic height indicator, showing at all times the height of the gaging arms above the lapped table surface.

The exclusive Sheffield electric gaging head is said to provide an electrical magnification of 2500 to 1. The scale of the head has a range of 0.0012 inch and is graduated in 50-millionths of an inch (0.000050). Graduations are spaced far enough apart so that interpolated readings of approximately 0.0000125 inch are possible.

Lincoln Park "Carblox" Cemented Carbide Gage Blocks

The Lincoln Park Tool & Gage Co., Lincoln Park 25, Mich., is now producing a line of cemented carbide gage blocks to be known as "Carblox." These blocks are said to retain their accurate size within the allowable wear tolerance over unsually long periods of use. According to the manufacturer, the blocks are practically non-magentic and are highly resistant to rust or corrosion. Their high cohesive factor is said to facilitate the wringing of thin blocks.

Carblox are furnished to "A" accuracy (0.000004 inch) and "B" accuracy



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ACCURACY — PROMPT SERVICE

Commercial Centerless Grinding Co.

6603 Cedar Avenue Cleveland, Ohio

More production per worker!



FOOT CONTROL LEAVES BOTH HANDS FREE TO WORK!

Features: *Vise opens and closes instantly . . . Remains open or closed without constant foot pressure . . . Exerts grip of 15 times air-line pressure. . . Measures 12 x 6½ x 6 in. . . . Jaw width 3 in. . . . Jaw depth 2 in. . . . Maximum opening 3 in. . . . Maximum travel ½ in. Attaches to air line or individual compressor.*

SPEEDY AIR VISE
complete with Foot Control Valve, Air Hose and Fittings . . **$24**

Want more production? Follow the example of leading war plants — put *Speedy Air Vises* to work! This foot-controlled, pneumatic vise leaves operator's both hands free for safe, fast insertion and removal of work. You'll find it cuts time, labor and costs, reduces fatigue. Sturdy, compact, precision-built . . . so low in price it can be economically used on every drill-press, miller, filer and assembly line. Prompt delivery. Ask your distributor or write for details.

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AMERICA'S MOST TALKED-ABOUT VISE . . . AT A PRICE!



Lincoln Park "Carblox" Cemented Carbide Gage Blocks

(0.000008 inch) as a series of a gage block build-up or as individual blocks when a build-up is not required. The 14-block set consists of two 0.050-inch blocks, two 0.100-inch blocks, and one 0.05005, 0.0501, 0.0502, 0.0503, 0.0504, 0.0505, 0.0506, 0.0507, 0.0508, and 0.0509-inch block. The 0.050 and 0.100-inch blocks are also furnished in boxes in pairs as well as in combination —two 0.050-inch and two 0.100-inch blocks in a box.

Progressive Portable Seam Welding Gun

An air-operated portable gun by means of which parts that are too large to be readily handled, also large assemblies which are mounted in stationary fixtures, can be seam-welded has been announced by the Progressive Welder Co., 3050 E. Outer Drive, Detroit 12, Mich. The gun is designed for welding up to two thickness of 20 gauge steel, including stainless. The gun is universally suspended and can be swiveled about so

COMET

BORING, FACING and INTERNAL THREADING TOOLS

For holes from 1/8" upward, 15 different sizes

Made of Super-High-Speed Steel
Specially Heat Treated

Indispensable for your JIG BORER. The worm-like spiral of the boring heads provides a long, useful cutting surface. Their use insures perfect fitting threads. Correctly designed for precision work.

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COMET TOOL CO.
738 Broadway, New York, N. Y.





TO SPEED THE WHOLE JOB...

Speed the Finish with SKILSAW DISC SANDERS!

● Chances are you're doing more surfacing jobs than ever . . . on wood, metals, stone, plastics or compositions . . . and you're *sure* to get those jobs done faster with SKILSAW DISC SANDERS. They've got the punch and power for peak output on every operation from coarsest grinding to finest sanding. Yet SKILSAW DISC SANDERS are light and compact for easier handling anywhere.

SKILSAW DISC SANDERS are powered for use with wire brushes, cup grinding wheels, sanding discs, polishing bonnets and rubbing pads. That's why they're preferred for *all* finishing . . . on all surfaces . . . of all materials. Ask your distributor to demonstrate SKILSAW DISC SANDERS in your own plant. Phone him *now!*

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SKILSAW Quality ABRASIVE DISCS

● For finer, faster sanding . . . at lower cost . . . insist on Genuine SKILSAW Quality ABRASIVE DISCS. They're scientifically made of sharp-cutting aluminum oxide . . . bonded to a flexible fibre back with heat-resisting resin. That's why they sand *faster* and wear *longer*.

Available in 2 sizes and in all popular grits and grades. Write for recommended types . . . or phone your distributor for SKILSAW Quality ABRASIVE DISCS *today!*

SKILSAW PORTABLE ELECTRIC TOOLS
★ *MAKE AMERICA'S HANDS MORE PRODUCTIVE* ★

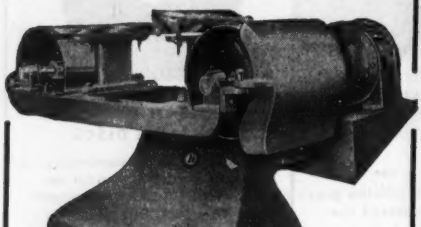
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Fast



PEERLESS Abrasive Surfacer

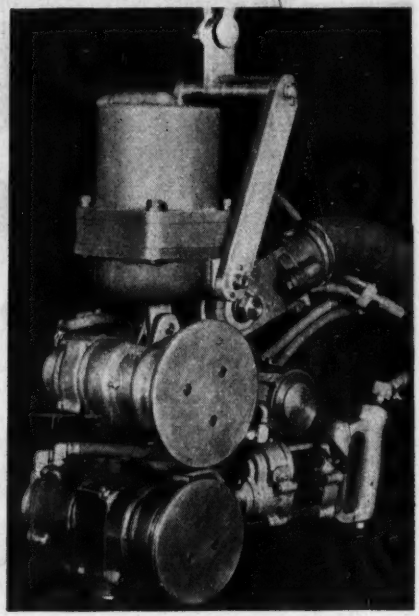
These machines are extremely fast for grinding and sanding flat surfaces of metal, wood, rubber, plastics, etc., and can be furnished in 9", 14", and 20" sizes.

Other types Vertical and Horizontal for flat or round work.

PRODUCTION MACHINE CO.
GREENFIELD • MASS.

that the operator can weld in almost any direction.

Features of the Progressive Seam-Welding Gun include a head operated by an air motor using 2 cubic feet of air per minute under load. The motor is rated at 2 h.p. when run at a constant speed. Its standard speed is between 48 and 52 inches per minute, using standard rolls or wheels. A governor regulates the speed of the air motor.



Progressive Portable Seam-Welding Gun

When the seam-welding gun is in operation, the air passing into the handle runs the motor. Pressure on the control button located on the guide handle at the right of the gun operates a solenoid switch, letting the air into the cylinder on the gun. This air cylinder has a diameter of 4½ inches, which is large enough to provide a maximum pressure of 1,400 pounds per square inch with 90 pounds of line pressure.

The air flowing into the cylinder forces the upper and lower wheels together. The upper wheel is the idling wheel; the lower is the driven. When the air pressure reaches a preset value, the pressure switch starts the welding timer and the gun begins to seam-weld.



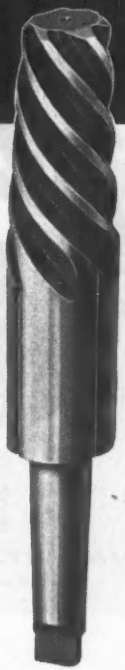
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To Insure Accuracy for Your Cutting Tools

To solve the daily production problems of hundreds of different types and sizes of special cutting tools we have supplemented the latest machinery and equipment with modern methods and fixtures, many of them exclusive to A. C. E.

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Send us your inquiries for quick estimates. Bulletin on request. Attractive territories are open for capable agents.



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AND ENGINEERING CORP., WARREN, MICH.

American Cutter & Eng. Corp., 31743 Mound Road, Warren, Mich.

SPECIALIZING IN HIGH SPEED CUTTING TOOLS TO YOUR PRINTS

The air motor runs continuously when the air is "on." Removal of pressure from the button control causes the solenoid valve to release the air in the cylinder. At the same time, the pressure switch cuts off both the timer and the welding current.

The transformer, cable, jumper, and bushings of the gun are all water cooled. The wheels are cooled internally, however, spray cooling for external parts of the wheels is available if required.

The Progressive Seam-Welding Gun has a throat depth of 3 inches. Its stroke is ½ inch when the wheels are new, and 2 inches maximum when the wheels are worn. Two wheels—one 5-inch and one 6-inch wheel—are provided with the gun. Gear reduction from the motor to the lower or driven wheel is such as to permit the changing of gears to change speeds. Spur gears and a double worm drive allow the use of a higher and lower speed than the standard speed of 48 to 52 in. per minute.

The gun is designed with a provision for maintaining the alignment of the rolls when the bushings wear. Maximum allowable wheel wear is 1½ inches.

Standard equipment of the Progressive Portable Seam-Welding Gun includes a pressure switch, solenoid air valve, control relay, air line strainer, lubricator and pressure gage, motor, air regulating valve, shut-off valve, pressure fittings for lubricating the moving parts of the gun, and an adjustable counterbalancing hanger which supports both the gun and the transformer. The transformer is rated at 100 kva, is water cooled, and operates at 440 volts—60 cycles. The cable is 750,000 cm. concentric kickless type. A dial type switch with six stages of heat selection, located on the transformer, allows for accurate heat control.

New Nesting Type Tote Pans

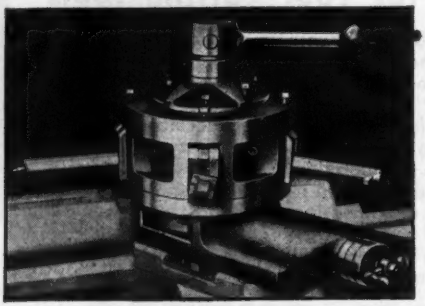


20" long x 12" wide x 6½" deep.
16 ga., drag holes and handles both ends.

J. L. LUCAS & SON, INC.
Bridgeport, Conn.

Our NEW IMPROVED

5 STATION LATHE TURRETS ARE VITAL TO PRODUCTION



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THIS, WITH TEN ACCURATE INDEXED TOOL POSITIONS ALLOWS MINUTE ADJUSTMENTS

These New Improved Turret Heads are sturdily built with tools adequately supported for heavy cuts and can be depended on for long, hard, precision service. Even inexperienced lathe hands can quickly become fast operators when you convert your engine lathes into production machines with Our New Improved Turret Heads.

MADE IN FOUR INDIVIDUAL SIZES
For Lathes From 9" to 30" Swing

AUTOMATIC MACHINE & TOOL CO.
ENGINEERED PRODUCTS
AUBURNDALE, MASSACHUSETTS

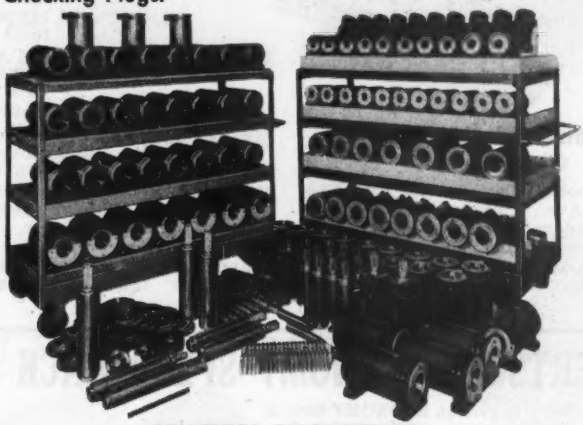
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Complete **GAGING SYSTEMS** *for*

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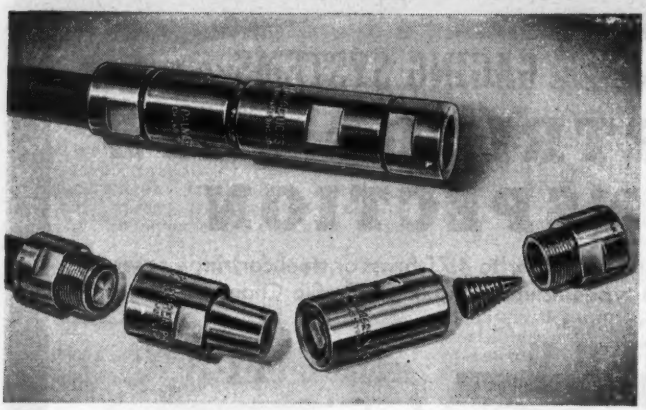
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REG. U. S. PAT. OFF.

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Manufacturers of "QUALITY PRODUCTS"

Speed Victory
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Palmgren Solderless Cable Connector

Palmgren Solderless Cable Connector

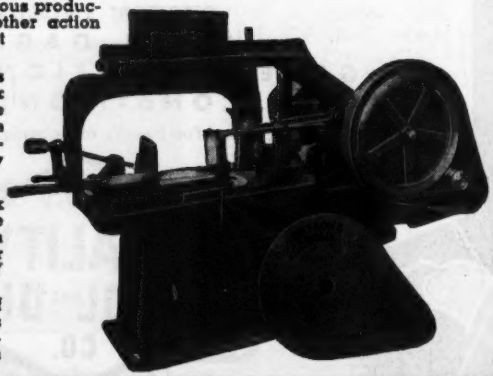
Chicago Tool & Engineering Co., 8399 S. Chicago Ave., Chicago 17, Ill., announces the development of the Palmgren Solderless Cable Connector shown in the accompanying illustration. Use of this connector makes it possible to quickly assemble various lengths of welding or other flexible type cable to their respective connectors in the field without special tools—the only tools required being a knife to remove the cable insulation and a pair of pliers to tighten the nut of the Palmgren unit.

The body of the Palmgren Solderless Cable Connector can be adapted to welding cable in sizes ranging from No. 1 to No. 3/0 inclusive merely by using the proper size adapter nuts. The connector is interchangeable with the standard solder type Palmgren cable connector; that is, one cable having a

ROBERTSON'S *ECONOMY* SPEED HACK SAWS

The No. 4X Type Robertson ECONOMY Saw is especially suited for heavy, continuous production metal cutting and gives smoother action and faster cutting. Other salient features include—

● Bronze brushed journal bearings ● Standard stroke of 6" ● Automatic stop ● Gravity feed with adjustable pressure blocks ● Hydraulic lift on back stroke ● Standardized construction ● Accessibility to all parts ● Few adjustments.



Robertson ECONOMY Power Hack Saws are in use throughout the world—more than 30,000 have been installed. Make your next power hack saw a Robertson ECONOMY for speed and accuracy.

Robertson builds a complete line of Power Hack Saws in sizes and types to suit your needs. Send for illustrated folder Form 1-A which gives complete details.

W. ROBERTSON
MACHINE & FOUNDRY CO., INC.
52 RANO ST. BUFFALO, N. Y.

STAMPING

MULTIPLE CHARACTERS



with Matthews

'Champion' HOLDER

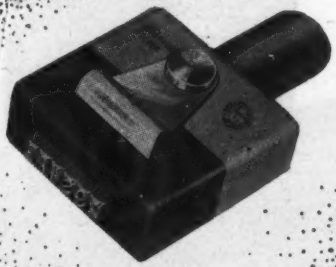
Made for hand stamping or press use . . . Matthews 'Champion' Holder can be used for 90% of all heavy or medium duty marking applications. Type changing is amazingly fast . . . marking is clean cut and in alignment. Write for Catalog 146-A for full particulars.



FOR HAND STAMPING



FOR STAMPING ROUNDS



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JAS. H. MATTHEWS & CO.

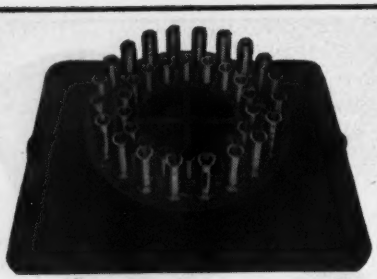
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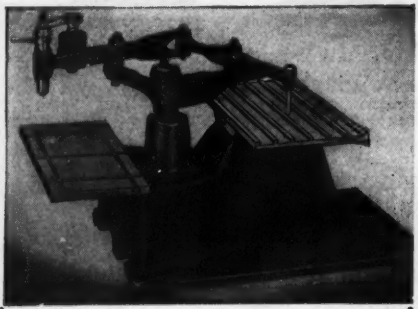


Pictured: a 38-Spindle Heavy-Duty Drill Head.

DESIGNERS AND MANUFACTURERS OF MULTIPLE DRILLING EQUIPMENT.

We invite your inquiry.

MICHIGAN DRILL HEAD CO.
971 E. 8 MILE ROAD HAZEL PARK, MICH.



NEW DUPLICATING - PROFILER - ENGRAVER
PROFILES + DUPLICATES + ENGRAVES
Easily Operated by Women
Engraves: Iron, Soft Steel, Copper, Brass, Aluminum, Plastics
Larger Engraving Area
Larger Working Area
More Ratios 1:1 to 2:1 by Eighths
Variable Spindle Speeds
Priced from $225.00—write for details
AUTO-ENGRAVER COMPANY
1776 Broadway, New York, N. Y.

standard solder connctor at one end can be plugged into another cable having the solderless type connector.

The illustration shows a taper plug which is forced into center of cable after insulation is removed. Then by screwing nut and body of connector together, the taper plug is pressed flush with threaded end of nut, thus making a tight connection with positive conductivity.

U. S. Continuous Milling Fixture

A self-contained motor-driven milling fixture which can be adapted to any standard make of milling machine for

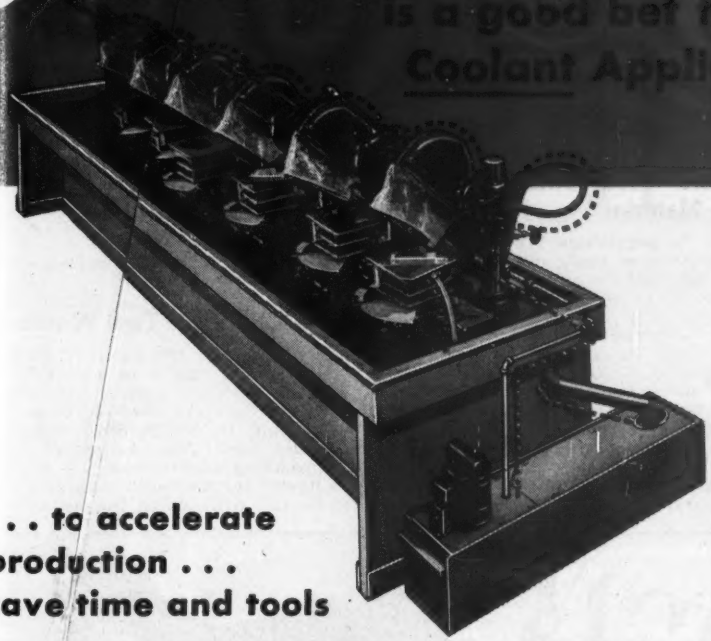


U. S. Multi-Miller Equipped with Continuous Milling Fixture

use in the continuous form milling of bar stock has been developed by The U. S. Tool Co., Inc., Ampere (East Orange), N. J. The fixture can be built to any size, depending upon the material to be milled and the size of the milling machine with which the unit is to be used.

Six to one...

is a good bet for Coolant Applications!



Model G-4AX, high pressure, with gear type pump, serving 6 quartz cutting saws. Capacity 150 to 165 g. p. h. Also available, Model G-10AX, centrifugal type, with capacity up to 2000 g. p. h.

. . . to accelerate production . . . save time and tools

HERE is a picture of efficiency—*plus;* one Hi-Pressure Gray-Mills Portable Coolant System supplies coolant to six quartz cutting saws—assuring faster, better cutting—saving time and tools.

Specially designed for abrasive cutting and grinding operations, this Gray-Mills Portable Coolant System, Model G-4AX, applies coolants at high pressure with controlled flow. Baffle plates and special pump filters settle out abrasives.

Model G-4AX is one of a complete line of Portable Coolant Systems that have increased the efficiency of hundreds of machines on operations like drilling, milling, sawing, grinding, honing, tapping, threading and cutting. They are quickly and easily set up. Sturdily built, Gray-Mills Coolant Systems are available in both gear and centrifugal types, with capacities from 50 to 3,000 gal. per hour—controlled flow. Prices range from $39.50 to $189.50. . . . There is a Gray-Mills for every job. Ask your distributor for a demonstration, or write direct.





Above: Standard Heavy Duty "A" Series — with large capacity tanks incorporating baffles and screens. Capacities, up to 165 g. p. h. — pressure, 50 lbs.

Left: Model "G" Series —Capacities up to 130 g. p. h.—pressure, 30 lbs.

GRAY-MILLS CO., 217 W. Ontario St., Chicago 10, Ill.

PROMPT DELIVERIES

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GRAY-MILLS

Complete Portable Coolant Systems

Use GRAY-MILLS COOLANTS . . . 5 types for most requirements—10 and 55 gal. containers—immediate delivery from your distributor or our plant.

The U. S. Continuous Milling Fixture is equipped with power-driven feed-in and take-out rolls which control the movement of the bar stock through the fixture down to the very end of the stock, thus eliminating waste. The feed-in and take-out rolls are grooved to accommodate the particular shape of bar stock being handled.

"Emeri-Crete" Floor Patching Material

"Emeri-Crete," a permanent type floor patching material now being marketed by the Walter Maguire Co., Inc., 330 W. 42nd St., New York 18, N. Y., is intended primarily for use in filling cracks, small depressions, ruts, and other imperfections in concrete or cement floors. It was developed to meet a demand for a ready-mixed material which could be applied immediately after water had been added.

Emeri-Crete is composed of the same pure emery that comprises the well-known Cortland Emery Aggregate. However, in Emeri-Crete, only the smaller particles of emery are used. These are mixed with a special quick-setting binder which allows the use of the floor six or seven hours after the repair has been made.

Emeri-Crete is supplied in small packages, permitting use of just the right amount of material to do the job at hand with no waste. Complete instructions for mixing and applying are furnished with the material.

According to the manufacturer, Emeri-Crete will not shrink after application, has great adhesive properties, and, if applied in accordance with directions, will provide permanent repairs.

Smith Portable Cable Tape Winder

Especially designed for use in taping comparatively long cables or a number of cables into a single unit, a portable cable tape winder has been developed by the Leathem D. Smith Shipbuilding Co., Sturgeon Bay, Wis. As shown in the accompanying illustration, the winder is designed for use with a standard portable electric drill which the operator

NEW!



MODEL SP400

BRADY-PENROD

SELF-PRIMING CENTRIFUGAL COOLANT PUMPS

"They Pump Air"

Through clever application of the fundamental principle of Patent No. 2,164,869, these pumps are simple in design, thoroughly dependable and instantly self-priming on normal suction lifts encountered with machine tools. Model SP400 is sturdily built, with all the superior BRADY-PENROD features, to handle abrasives and steel chips. Easily installed on present machines or quickly adapted to new machines.

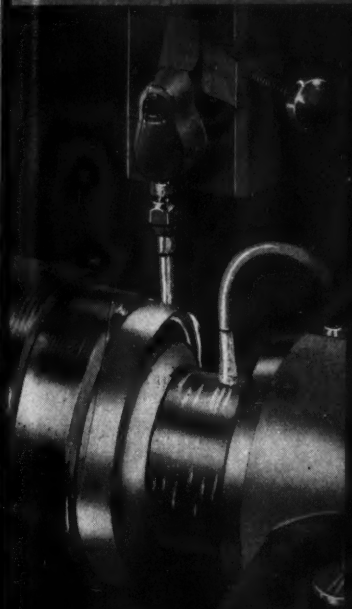
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The new, different lubricant and coolant.

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The first entirely new approach in twenty-five years!

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Makes 5 tools do the work of 7 . . . 40% increase in tool life.

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Holds work at levels not measurably above room temperature.

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Completely water washable . . . no solvents or alkalies needed.

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(In the Heart of the Machine Tool Industry)

TRAINED SERVICE MEN AND WAREHOUSE STOCKS IN ALL PRINCIPAL CITIES

holds in one hand. In the other hand, the operator holds the handle of the



Smith Portable Cable Tape Winder

winder, thereby enabling him to accurately control the taping which is fully visible during the entire operation.

The Smith Portabl Cable Tape Winder can be easily adapted to different size cables and, according to the manufacturer, is particularly useful in shipbuilding where many cable taping operations are performed by hand.

"Absorbo" Oil and Grease Absorbent and Floor Cleaner

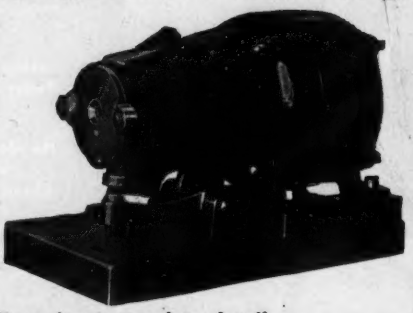
An oil and grease absorbent and floor cleaner to be known as "Absorbo" has been developed by the Fidelity Chemical Products Co., 430 Riverside Ave., Newark, N. J. Approved by Underwriters' Laboratories, Inc., the material, though granular in form, is said to be non-abrasive and, consequently will not damage machinery or working parts due to abrasive action. According to the manufacturer, the material is also odorless, nonpoisonous, and non-injurious to skin, clothing, or flooring, and may be readily spread by hand on any type of floor surface, absorbing 45 to 50 per cent of oil or grease by weight.

Absorbo Oil and Grease Absorbent and Floor Cleaner is supplied in 50-lb. bags.

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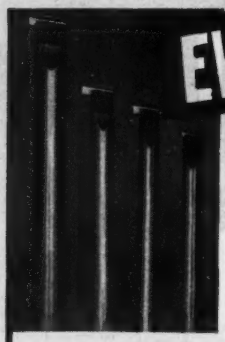
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30 YEARS EXPERIENCE

Aircraft Rivet Squeezers



We manufacture over 25 sizes of rivet squeezers.

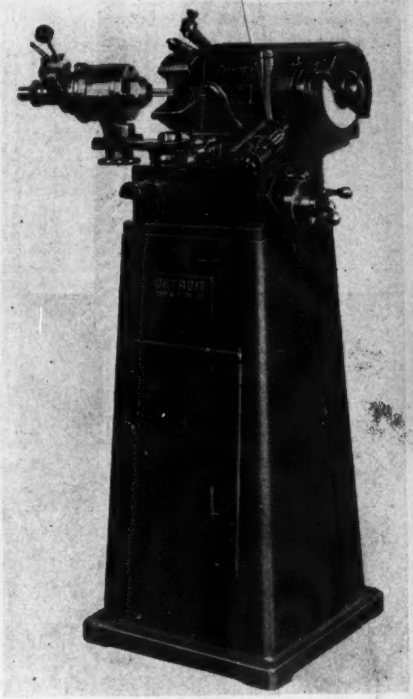
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Write for New Aircraft Catalog.

WHITNEY METAL TOOL COMPANY
110 FORBES ST. • ROCKFORD, ILL.

Detroit Improved Tap Reconditioner

Improvements in the design of its tap reconditioning machine are announced by the Detroit Tap & Tool Co., 8432 Butler St., Detroit 11, Mich. Features of the improved unit include a new spindle head that accommodate interchangeably

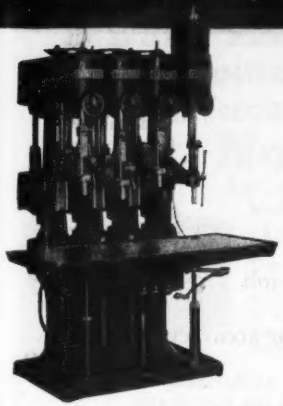


Detroit Improved Tap Reconditioner

a wide range of motor types for the various service voltages, phases, and frequencies required in industry. Unusual rigidity of the spindle head plus continuous adjustability for grinding tool wear is obtained by mounting the spindle assembly on large dovetail ways in the pedestal base.

The tap chamfering unit, located at the left of the machine, is of the precision collet type and has been improved to facilitate changing of taps and collets and assure maximum locating accuracy. It will accommodate collets from





FOR *Full Range Drilling*

★ For successive operations of drilling, reaming, counterboring or tapping, the No. 2 Sensitive Drilling Machine is ideally suited. With back gear unit, power feed, tapping attachment and high and low speed range, the most efficient arrangement is available for all types of operations. Two, three, four or six spindles are standard on 10" centers, but various arrangements with regard to number of spindles and center distance may be easily made to meet specific requirements.

THE FOOTE-BURT COMPANY • Cleveland 8, Ohio
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NO. 2 MACHINE WITH BACK GEAR

8" or 12" overhang . . . ⅝" drilling capacity in steel . . . optional speed ranges . . . 185 to 2300 R.P.M., 280 to 3450 R.P.M. . . . vertical motor drive with standard single speed motor . . . power feed assembly . . . tapping attachment . . . coolant outfit.

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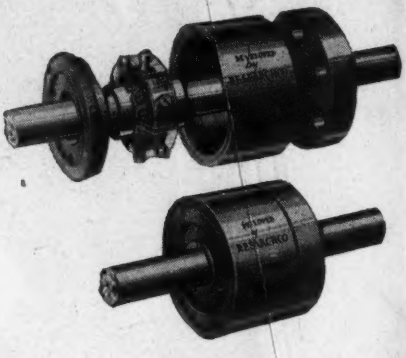
the smallest machine screw size up to the 1¼-inch standard tap shank size, including sizes for holding long shank taper taps.

The design of the Detroit Improved Tap Reconditioner also allows for the performance of spiral pointing and spiral point polishing operations. The ½ h.p. spindle motor of the machine is controlled by a manual switch mounted in the base, and is available for operation on 220 or 440 volts, 3 phase and 110 volts, single phase, 25 or 60 cycle current.

"Torkontrol" Clutch

An automatic self-engaging and self-disengaging clutch which is actuated entirely by the principle of centrifugal force, to be known as the "Torkontrol," has been developed by the Amalgamated Engineering & Research Corp., 100 W. Monroe St., Chicago, Illinois.

The unit consists essentially of a partially filled oil chamber in which is fitted a movable hub that is free to rotate within the body of the clutch. Between the hub and the outer portion of the body is placed a series of movable weights. Under the action of centrifugal force these weights fly outwardly until



"Torkontrol" Clutch

they engage the rim of the clutch body, thereby bonding the entire mass into one solid unit. After this condition has been attained, the clutch functions in the same manner as any other solid pulley or coupling and continues to do

★ ★ ★ ★

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MEN skilled by experience
METALS selected for each job
MACHINERY built for accuracy
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LOAD CUSHION TYPE "W"

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Why they most efficiently absorb shock, vibration, and correct misalignment. Catalog with free Selector Charts. Write

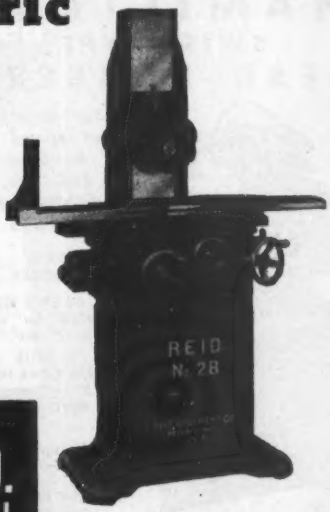
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Nameplate Detail Press

This machine quickly stamps details and serial numbers into name plates.

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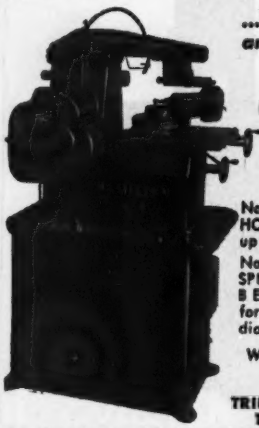
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HAMILTON

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GEAR HOBBERS



***...for accuracy and speed in hobbing* PINIONS, GEARS *and* SECTORS.**

TWO MODELS

No. 00 SPUR GEAR HOBBER for work up to 2" dia.

No. 1 SPUR and SPIRAL GEAR HOBBER (Illustrated) for work up to 6" dia.

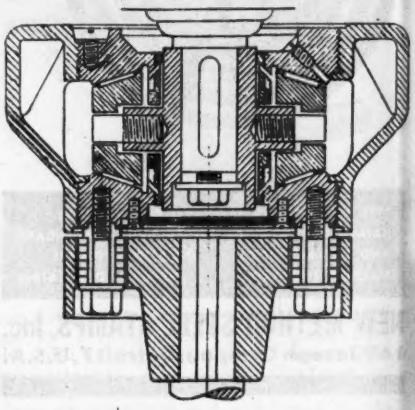
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Exclusive Sales Agents
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Manufactured by
THE HAMILTON TOOL CO.
Hamilton, Ohio

so as long as the machine is in operation. The unit is said to work equally well with rotation in either direction and is instantly reversible.

An outstanding advantage of the Torkontrol Clutch is that it enables the prime mover, whether it be an electric motor, gasoline engine, turbine, or isolated driving shaft, to attain speed before application of its load. By virtue of this characteristic an electric motor, for example, is enabled to develop its maximum torque before overcoming the torque incidental to the application of the machine load. As a result, a smaller motor can be used for any given load, or an existing motor, when connected to its present load, will require less current in starting.



(Above) Design of "Torkontrol" Clutch as adapted for Vertical Coupling. (Below) "Torkontrol" Clutch as applied in Small Diameter Pulley.

The Torkontrol Clutch can be designed

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Precision Gears of All Types

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IN ALL MATERIALS—IN SIZES 5/16" TO 16"

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Solve Difficult Angle Jobs
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- Quick Accurate Setups at any angle.
- Sturdy Longlife Construction.
- All Parts Accurately Machined.
- Jaws Hardened Steel—Plain or Grooved
- Made in Sizes from 1½" to 8" Jaws.

Write for circular R-12 "101 Angle Operation" and complete line of PALMGREN Vises.



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Mfrs. of PALMGREN PRODUCTS for over 25 years
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Production Insured
BY INSTALLING
PADDOCK Ball Bearing BAND SAW GUIDES

Recommended for New and Old Machines cutting all material at any speed.

SENT ON 10 DAYS' TRIAL

The use of Paddock Ball Bearing Guides increases the efficiency of the machines so that more and better work can be done. The hazard of operation is reduced. Most of the blade breakage is eliminated. Wheels are interchanged—in effect, three sets of guides in one.

Write for details today and list of prominent manufacturers using Paddock Guides.



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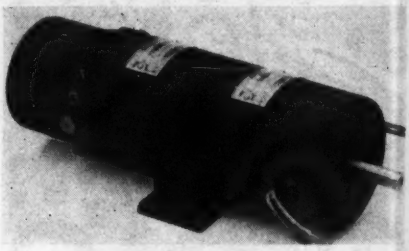
for any given load and any degree of overload. This latter feature is highly desirable from a safety angle. At a given point, should an excess load be applied, the unit will slip and continue to slip until the overload is removed. Due to the oil filling in the chamber, wear due to this slip is said to be reduced to a minimum.

The clutch is made in two different styles for mounting on either a horizontal or vertical shaft. Both vertical and horizontal models are designed in such a manner that they may be used either for belt drive from a pulley or direct drive through a self-aligning coupling, or a combination of the two.

Elinco Model L32 Motor-Generator

The illustration herewith shows the Elinco Model L32 Motor-Generator now being offered by the Electric Indicator Co., 110 Parker Ave., Stamford, Conn. The unit is designed for operation on 6-volt d.c. input. (Models for operation on 12, 24, or 115-volt d.c. input are also available.) Output varies with the speed at which the unit is operated.

The design of the Elinco Model L32 Motor-Generator includes a black synthetic-enameled aluminum housing, speed regulator, and resistor. A speed governor may be obtained as optional equipment. According to the manufacturer,



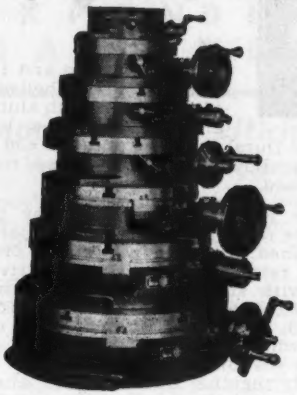
Elinco Model L32 Motor-Generator

the speed of the Model L32 is controlled within 1 per cent for 25 per cent variation in input or load, and the generator will deliver 27 volts, 2 phase a.c. at 2,400 r.p.m.

The Elinco Model L32 Motor-Generator is 6¼ inches long, 2 inches in diameter, and weighs 32 oz. The unit is base



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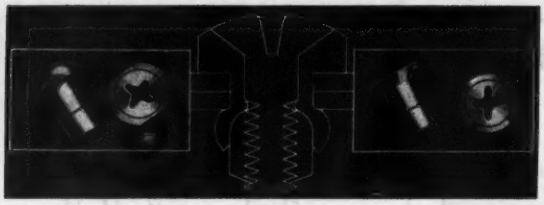


Fig. 1927
Pat's. Pend.

Over 40 Years in Business

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"Preco" Blind Rivets

mounted and is equipped with a single ⅜-inch shaft with 1-inch extension from front of case.

"Preco" Blind Rivet

Development of a blind rivet of unusually simple yet positive design is announced by the Pacific Railway Equipment Co., 960 E. 61st St., Los Angeles, Cal. Applicable to practically all types of riveting operations, the rivet, which is known as the "Preco," is said to be particularly adaptable for blind riveting.

According to the manufacturer, the Preco Rivet is the result of the simple combination of three parts—a steel cadmium-plated recessed head screw, either Phillips or Reed and Prince, inserted into the hollow stem of a high strength aluminum alloy rivet, and a knurled nut of Dural threaded onto the end of the screw. Both rivet sleeve and nut are anodized.

The rivet, the manufacturer claims, can be readily installed by inexperienced workmen with the aid of an ordinary hand ratchet or power screw driver fitted with small Preco adapter and finder. In emergencies, the rivet can, it is stated, also be installed with a pair of ordinary pliers and screw driver. Once installed, the rivet grips sheets tightly together due to the expansion of the rivet sleeve in the hole, and the installation is said to be unaffected by heat or cold or sudden changes in temperature.

The Preco Blind Rivet is available in two types; namely, a raised head type and a flush head type. Each type is

Butterfield Taps

What are Your Tap Requirements?

No matter what the job—large or small—if you require accurate work and long life from your taps, then, you should use Butterfield Taps. They can be supplied in four different grades as follows—

1. Carbon Steel Cut-Thread Taps
2. High-Speed-Steel Cut-Thread Taps
3. High-Speed-Steel Commercial Ground Thread Taps.
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Write for the latest Butterfield Catalog.



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BUTTERFIELD DIVISION

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NICHOLSON EXPANDING MANDRELS



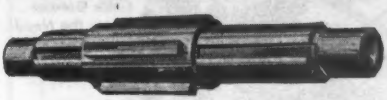
Improve Shop Efficiency and Increase Production

TYPE A—STEP JAW DESIGN

Especially adapted for holding work with short bores while being machined between centers on lathes, grinders, millers, shapers, etc.

Size No.	Range of Bores Taken	Net Price
1A	½" to 1"	$12.00
2A	1" to 1½"	16.00
3A	1½" to 2"	23.00
4A	2" to 3"	34.00
5A	3" to 4"	40.00

(Other Sizes Taking Up to 7" Bores) Hardened tool steel, accurately ground. Sold singly or in sets. Prompt delivery. Write for bulletin.



TYPE B—STRAIGHT JAW DESIGN

Adapted for work with both short and long bores.

Size No.	Range of Bores Taken	Net Price
1X	½" to 15/32"	$10.00
2X	15/32" to 21/32"	11.00
3X	21/32" to ¾"	12.00
00	¾" to ⅞"	14.00
0	⅞" to 1"	16.00
1	1" to 1¼"	18.00
2	1¼" to 1⅝"	21.00
3	1⅝" to 2"	29.00
4	2" to 2½"	40.00

W. H. NICHOLSON & CO., 136 Oregon St., Wilkes-Barre, Pa.

EXTRA STRENGTH
Can Save Time and Labor



When three screws can do the work of four, five or more, they save drilling, tapping and assembling time and labor. They speed production and cut costs.

Mac-it Hexagon Head Cap Screws are heat-treated for maximum strength and toughness. This extra strength can be used to provide ample holding power with fewer screws.

The Mac-it "m" on the hex head is your guarantee of quality. It appears on all diameters ¼" to ¾", inclusive.

4331

OTHER MAC-IT PRODUCTS INCLUDE:

Hexagon Socket Cap Screws, Hollow Set Screws
Hollow Pipe Plugs, Stripper Bolts
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PRONOUNCED "MACK-IT"

Drive OUT the "WOBBLIES" From ALL rotating parts



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Improved Dy-Namic Balancing!

Learn all about this new-principle, simpler, easier-to-operate, lower-cost Bear Dy-Namic Balancing, that enables you to get rid—*faster and easier*—of the destructive "Wobblies" of Dy-Namic Unbalance ...both on the products you machine or manufacture, and also on your own production machinery.

See the complete range of Bear Dy-Namic Balancing Machines, each specially designed to meet certain balancing problems. For example, the inexpensive Bench Model 337 shown above is for precision balancing of small armatures, shafts, wheels, gears, etc., and all other small, *fast-rotating* parts, from 4 oz. to 12 lbs. Other Bear machines to Dy-Namically Balance rotating parts up to 4000 lbs.



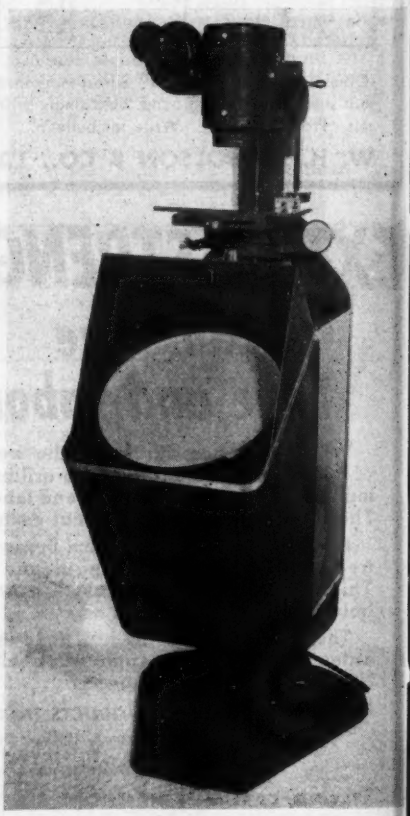
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Address BEAR MFG. CO., DEPT. MMS, ROCK ISLAND, ILL.

BEAR
DY-NAMIC BALANCING

made in three diameters—$\frac{1}{8}$, $\frac{5}{32}$, and $\frac{3}{16}$ inch — with grip lengths covering the normal range. All are color coded to denote grip lengths. The shear standard and other physical strength characteristics of the Preco Rivet are said to compare favorably with those of standard A D rivets.

Portman Model P2-14 Optical Comparator

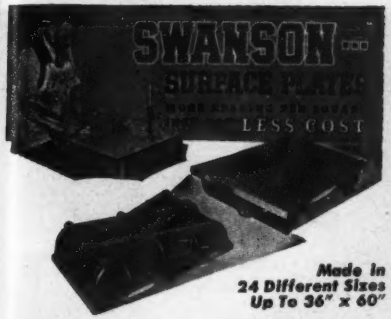
Designated as the Model P2-14, an optical comparator which includes in its design several advanced features not available heretofore in other Portman comparators has been placed on the



Portman Model P2-14 Optical Comparator

IF YOUR WORK REQUIRES THE FINEST IN ACCURACY AND WORKMANSHIP,

SPECIFY --



Made in 24 Different Sizes Up To 36" x 60"

Swanson Tool & Machine Corporation

810 East 8th St., Erie, Pa.

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SINCE 1919

Why Use A Shaper

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For precision grinding . . . internal or external . . . Majestic simplicity of design and flexibility of changeover guarantee maximum grinding output at low cost.

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Representatives in all principal cities

MAJESTIC TOOL & MFG. CO.

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market by the Portman Machine Tool Co., 70 Mill Rd., New Rochelle, N. Y.

The coordinate stage of the Model P2-14 is larger than on previous models, resulting in greater mechanical capacity. In addition, new type dial indicators having larger dial faces are now used, thus providing for increased precision measurement control. Another new feature of particular importance is a "Shaft-Of-Light" blower-cooled lamp housing which includes a condenser lens unit of larger size mounted as an eccentric assembly within the housing. Provision is made for sensitive light beam adjustment under all operating conditions.

The Portman Model P2-14 Optical Comparator may also be obtained with a plain work stage unit for use on production jobs or where coordinate measurements are not required. Magnification lens units of 10X, 20X, 31¼X, 50X, 62½X, and 100X are available as standard equipment. The comparator is furnished with a 14½-inch diameter image screen, weighs approximately 400 lb., is 60 inches high overall, and occupies a floor space of 24 x 30 inches. Accessory equipment available includes surface illuminator attachments and two types of center stages.

Dix Multiple Carriage Stop

Among the products and accessories for increasing lathe production now being marketed by the Dix Mfg. Co., 603



Dix Multiple Carriage Stop

E. 55th St., Los Angeles, Cal., is a multiple carriage stop which is made in sizes to fit all types and sizes of lathes. Sturdily constructed of high quality cast iron together with hardened steel parts,

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SPEED UP PRODUCTION!
ONLY 3 MINUTES . . .
...After Tracings leave your Drafting Boards, Perfect Blueprints or Black-and-White Prints are ready for use. No more delays waiting for outsiders to make delivery of prints at excessive costs.
With VICTORAY Your Cost of Blueprints will be approximately 1c per square foot
Check this against your present cost. VICTORAY makes professional prints. Can be operated by any novice. Printing is done in daylight.

• VICTORAY makes blueprints, black-and-white prints, photo copies—and serves as photo print dryer. No other unit does so much—yet costs so little to own and operate! $127.50 NET F.O.B. Factory
Sample Supply of Blueprint Paper and Developer Included.

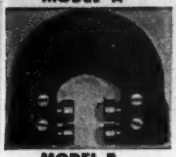
• Printing life of lamps 750 hours
• Renewal cost of set of lamps $1.60

VICTORAY CORPORATION
GENERAL OFFICES AND PLANT
BATTLE CREEK • MICHIGAN

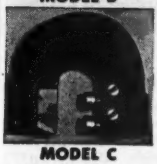
JOHNSON'S



MODEL A



MODEL B



MODEL C

Adjustable Limit SNAP GAGES

Keep down your gage costs by using these fast, accurate gages. Reset when necessary.

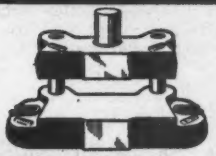
Also: Flat and Cylindrical Plug Gages, Built-Up and Solid Snap Gages, Flush Pin and many other types of gages.

WRITE FOR DETAILS.

***Factory:* Pequannock, N. J.**

W. E. JOHNSON CO. Turnpike and Pequannock Pequannock, N. J.

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STANDARDIZED DIE SETS

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Standardized Die Sets, embodying many exclusive features, a listing of more than 195,000 stock sizes and 46 different styles afford a service that is unsurpassed.

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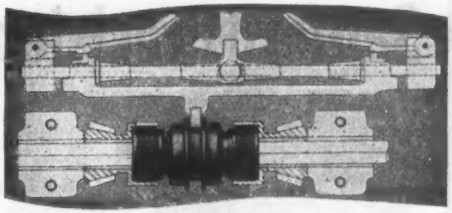
E. A. BAUMBACH MFG. CO.

1806 S. Kilbourne Ave. Chicago, Ill.

How PULLMORE CLUTCHES *Automatically*

Reverse Grinder Tables

This double type PULLMORE Multiple Disc CLUTCH and shifting mechanism application AUTOMATICALLY reverses the table of a grinder. If you believe that a similarly well adapted clutch might improve the performance of your machines and help you get the jump on competition, our power transmission. control engineers will be glad to suggest time, labor and power saving PULLMORE applications that will fit compactly into your new designs.





SEND FOR THESE CLUTCH BULLETINS

They contain numerous application diagrams. Give capacities, dimensions and specifications. Show how PULLMORE features are being used to help design stand-out machines that have sales-closing competitive advantages.

ROCKFORD DRILLING MACHINE DIVISION
309 Catharine St.
ROCKFORD, ILL.

B&W



the unit is designed for quick and rigid clamping to V-way of lathe and is adjustable for stopping lathe carriage in four positions.

The Dix Multiple Carriage Stop is said to greatly increase lathe accuracy and output whether employed by skilled or unskilled lathe operators.

Permutit "Sec-A-Sil" Silica Gel for Use in Packaging War Materials

A granular silica gel for use in packaging guns, engines, plane parts, and machinery to prevent rusting and corrosion during shipment, to be known as "Sec-A-Sil," has been developed by The Permutit Co., 330 W. 42nd St., New York, N. Y. The chemical is supplied packed in bags which are tied to the equipment to be packaged for shipment in a manner similar to that shown in the accompanying illustration. Parts thus arriving at their destination are said to be ready for use without involving any operations other than the removal of the bags.

Sec-A-Sil is said to protect metal parts by keeping the humidity of the entire

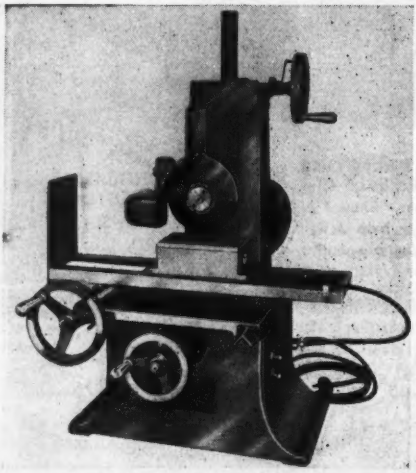


Illustration showing bags of "Sec-A-Sil" Silica Gel being tied to cylinder of aircraft engine

package at such a point that corrosion cannot take place. According to the manufacturer, silica gel granules absorb half their weight of water by physical action and do not swell, dissolve, or have any chemical reaction during the absorbing process.

Used in connection with Sec-A-Sil in each package of war material is a

Sanford Precision Bench Surface Grinder



A HIGH SPEED GRINDER FOR ALL SMALL PRECISION WORK

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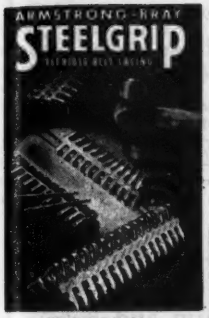
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STEELGRIP BELT LACING

A strong lacing for all types of belts. Put on with a hammer in a few minutes. Clinches smoothly into belt, compresses ends, prevents fraying. 2-piece hinged rocker pins provided. 8 sizes. In boxes, handy packages, cartons and long lengths.

Write for catalog sheets.

BELT LACING
Both types from 1 source

BELT HOOKS come with blue aligning cards that prevent waste—every hook can be used. Protects fingers. Applied with a WIREGRIP or any other standard Belt Lacing Machine. 6 sizes.



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All grip—no slip . . . no bearings, friction, heat or lost power . . . push out type . . . full spindle capacity or over . . . automatic adjustment . . . work re-set without stopping lathe . . . 2 sizes, 1" and 2" capacities . . . order now with proper priorities.

Agents wanted. Immediate deliveries.

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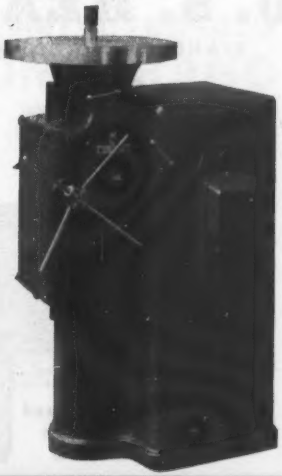
622 Tularosa Dr. ★ Ph. NO 9679 ★ Los Angeles 26, Cal.

Model 3 CONTOUR GRINDER

For economical, rapid and accurate grinding and polishing of contours or irregular shapes.

Capacity, diameter of wheels—½" to 4".
Capacity, face of wheels—2", 2½", 3".
Diameter of table—18".
Vertical reciprocation movement of spindle—$\frac{5}{16}$".
Quickly-mounted diamond dresser is standard equipment.

Write for folder of complete details.



No. 43 LEVELING JACK



Maintaining of machines level on foundations is important to accuracy.

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Drilling, Boring, and Tapping Machines TOLEDO, OHIO

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in throwing belts on or off moving pulleys on the line shaft.

Prevents accidents. Two sizes.

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U. S. HEADS
STANDARD SINCE 1915

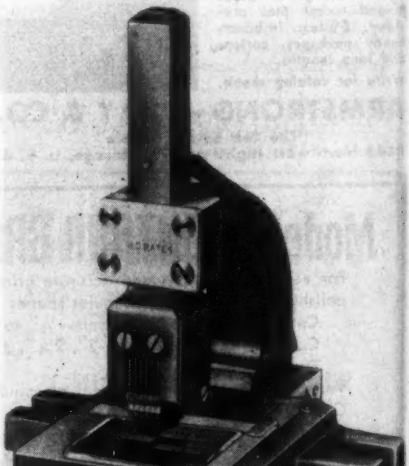


The United States Drill Head Co.
1954 Riverside Drive
CINCINNATI, OHIO

humidity indicator. This indicator is essentially a card containing cobalt impregnated silica gel which changes color as the air within the package changes in humidity, thus enabling inspectors to tell when the silica gel has absorbed its capacity of the moisture in the package or if the moisture-proof wrapper is leaking. When the air is dry, the cobalt granules are a deep blue, however, as humidity in the package increases, the granules change to violet through pink to white.

Acromark Arm and Base Numbering Machine

Said to provide a fast and accurate means for stamping numbers on machine parts, tags, and number plates,



Acromark Arm and Base Numbering Machine

the Acromark Arm and Base Numbering Machine shown herewith is now being marketed by The Acromark Co., 9 Morrell St., Elizabeth, N. J. The arm of the unit is arranged so that it can be flipped back to allow for quick changing of numbers with fingers or with small hand hook or stylus.

The die holder is made of a single



"It's a tough worm" says this bird.

ECLIPSE Seamless Flexible Metal Hose
Manufactured and Sold By

THE INVISIBLE CREW
Bendix
AVIATION CORPORATION

PHILA. DIVISION **DEPT. No. 2**
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NUMBERALL
IMPROVED TYPE HOLDERS
FOR HAND OR PRESS USE.
SUPER QUALITY STEEL TYPE
For stamping into Metal, etc.



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Actual Size

$15



TRY IT! METAL-BONDED DIAMOND HAND HONE

That Will Not Score, Groove or Chip

No more delays for re-sharpening! No more scoring or grooving! No more need to take up the time of a valuable tool-maker or grinder!

Just a few strokes with this hone make your high speed or the hardest cemented carbide cutting edges keen again. If you have a lathe, shaper, screw machine or miller, this hone will pay for itself in a week. $15.

Priority required. Immediate delivery.

Made in three grinding grit sizes: COARSE equals 100 GRIT
MEDIUM equals 220 GRIT — FINE equals 320 GRIT

We also manufacture diamond impregnated saws. 3 to 24 inch diameter. Write for circular.

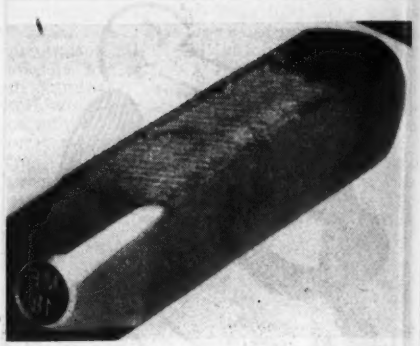
LET US QUOTE YOU ON DIAMOND DUST

DIAMOND TOOL REPLACEMENT CO.
(Div. of Oscap Mfg. Co., Inc.)
207 W. Saratoga St. **Baltimore 1, Md.**

piece of tough, shock-resisting alloy tool steel. A spring situated at the back of the square shank causes the die head to be quickly returned to normal position after shank has been struck with hammer, thus preventing "bounce marks." Adjustable guides located on the cast iron base of the machine provide accurate means for stamping series of parts in same position.

New Method Special Magnaflux Inspector's Stamp

New Method Steel Stamps, Inc., 149 Joseph Campau St., Detroit 7, Mich., announces a special inspector's stamp for marking work checked by Magnaflux inspection equipment. As shown in the accompanying illustration, the Magnaflux inspection stamp is similar in general design to the simplified inspectors' stamps introduced by New Method some time ago. A departure is the incorporation of the letters MF together with numeral or letter within a specially shaped border. This border may be any of a wide variety of shapes—circular, oval, square, triangular, and so on.



New Method Special Magnaflux Inspector's Stamp

The mark produced by the New Method Special Magnaflux Inspector's Stamp not only clearly designates that a part has been Magnafluxed but also allows for ready identification of the inspector who has passed the part through Magnaflux inspection, since each inspector can have his own stamp with particular engraved end.

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Let Willey's engineers design and build special cutting tools to fit your individual needs and machining operations. Tools "Tipped by Willey's" offer you definite price and production advantages. Good delivery. Send us your prints for quotation and delivery date.

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Contains full information about WILLEY'S METAL, standard cutting tools, special tools and gages, extrusion and wire drawing dies, centerless grinder blades and tungsten carbide grinders.

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Precision-cut, any material, spur, bevel, worm, helical, internal, small or large. No Stocks.

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RAPID CABLE AND TERMINAL CONNECTORS

Save Time — Labor — Expense

Speed up production—end needless delays! In 3 seconds, HOOK-UP — LENGTHEN — REPLACE or SHORTEN Cables with PALMGREN Cable Connectors. Positive contacts, highest conductivity with secure locking assured. No parts exposed—insurance against shorting and fire hazards. Connectors will handle 1, 1/0, 2/0, 3/0 and 4/0 cables. PALMGREN Engineers will gladly design new types for any special need. Write us today!





Write for Circular R-12 describing complete line.

CHICAGO TOOL AND ENGINEERING CO.
Manufacturers of PALMGREN PRODUCTS for Over 25 Years
8399 SOUTH CHICAGO AVE. CHICAGO, ILLINOIS

A Better Positioner for every welding job

No matter what type welding you do there's a C-F Positioner exactly suited to your requirements. Ranging from small hand operated models like the one above to the giant, push button controlled, monster shown below, C-F Positioners revolve weldments a full 360 degrees, tilt them to 135 degrees beyond horizontal—permit down-hand welding of all sides with a single set-up. All are universal tools; *are adjustable for height*, handle a wide range of work and are pedestal or boom mounted to give maximum floor and working clearance.

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Cullen-Friestedt Co.
1311 S. Kilbourn Ave.
Chicago 23, U. S. A.

C-F POSITIONERS

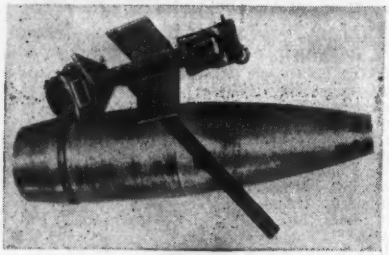


Above: Model No. 12, 1,200 lb. capacity manually operated.

Left: Model No. 300 30,000 lb. capacity.

Cunningham Dual Purpose Box Type Holder

To meet the requirements of shell manufacturers for a versatile and practical shell marker, the M. E. Cunningham Co., 158 E. Carson St., Pittsburgh 19, Pa., has made available the dual purpose box type holder shown herewith. The unit is made of a special "Safety" steel that is said to resist spalling and mushrooming, and is specially designed for stamping identification marks on the end and side of a semi-finished 155 mm. shell forging in one operation. Unique guide plates level both type holders to assure clear, uniform markings.

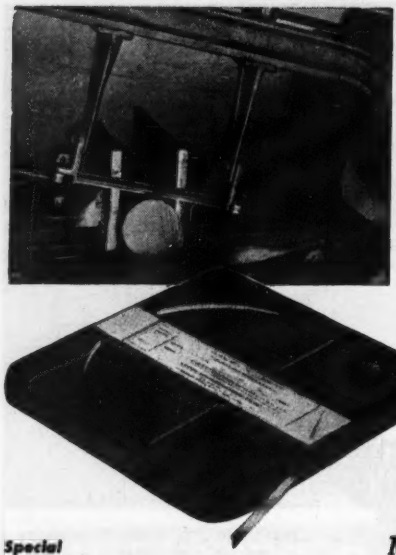


Cunningham Dual Purpose Box Type Holder

Minn-Kota Tap Grinding Tool

A device which can be readily installed on tool grinding machines and lathes for use in grinding right or left-hand plug or taper taps with any degree of chamfer and relief desired, to be known as the Minn-Kota Tap Grinding Tool, has been placed on the market by the Minn-Kota Mfg. Co., Fargo, North Dakota.

The device consists essentially of two cylindrical heads with centers fastened on long bar. The head at the left end is adjustable for accommodating taps of various lengths between centers. On the outside of each head, located in a slot, is an adjustable rectangular piece having a hole to receive center point of lathe or tool grinder. The rectangular pieces are graduated for 1/64-inch adjustments and, when properly set off center, give the tap the correct eccen-



ATLANTIC ★
Band Saw Blades
Speed Up
Metal Cutting Production

Atlantic Metal Cutting Band Saw Blades have been developed through twenty years of research and specialization.

Special Containers for narrow width coils, 100' length. Convenient to use.

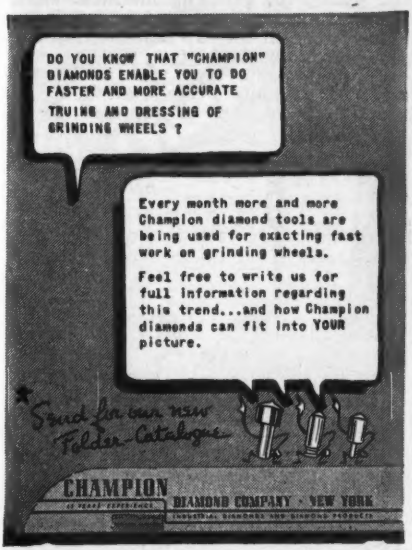
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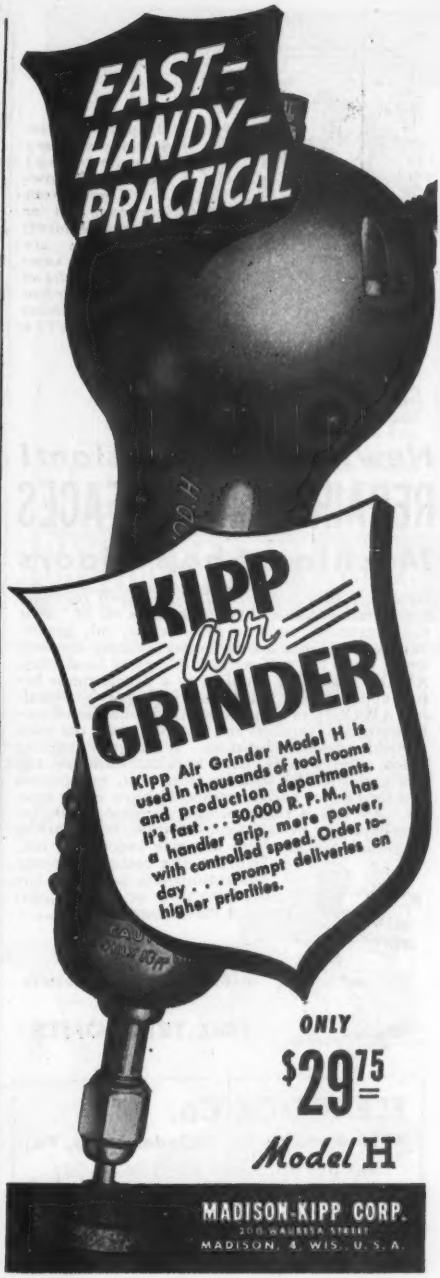
Metal Cutting Band Saws Exclusively

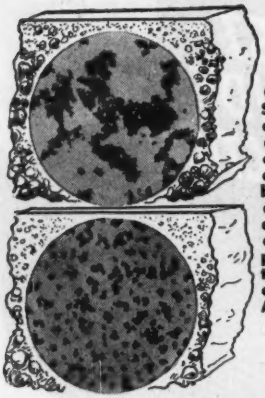
155 Brewery St., New Haven, Conn.




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Every month more and more Champion diamond tools are being used for exacting fast work on grinding wheels.
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Kipp Air Grinder Model H is used in thousands of tool rooms and production departments. It's fast . . . 50,000 R. P. M., has a handier grip, more power, with controlled speed. Order today . . . prompt deliveries on higher priorities.
ONLY
$29.75
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200 WAUBESA STREET
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Graphs of cross-Sections: ordinary concrete (top) and AWOG (lower) Light areas are cement or bonding element; dark spots are aggregate. Lower 'graph shows perfect dispersion throughout mass obtained with AWOG.

New! Super-Resistant!

REPAIRS or RESURFACES

Machine Shop Floors

Here is a new, scientifically developed resurfacing material that will lick the pants off of "floor disintegrators" such as acid, water, oil, grease. Where conditions are such that ordinary concrete won't stand the gaff without plenty of headaches, AWOG solves the problem to a degree never before approached. Aside from its impervious quality, AWOG sets up a smooth, case-hardened surface which is dustless and durable under the most punishing traffic conditions. Withstands grueling loads, steel wheels, hard knocks. Sanitary and easily cleaned because its close knit, non-porous surface cannot harbor germs, filth, or waste matter. AWOG is recommended for new floors; for over-lays over brick, stone, or wood; for repairing or resurfacing areas of any size indoors or out. It offers the utmost economy and trouble-free service to any machine shop or plant requiring a super floor.



Write for Further Information and Details

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2315 Manning St., Philadelphia 3, Pa.

Please send me complete AWOG information . . . details of FREE TRIAL OFFER—no obligation.

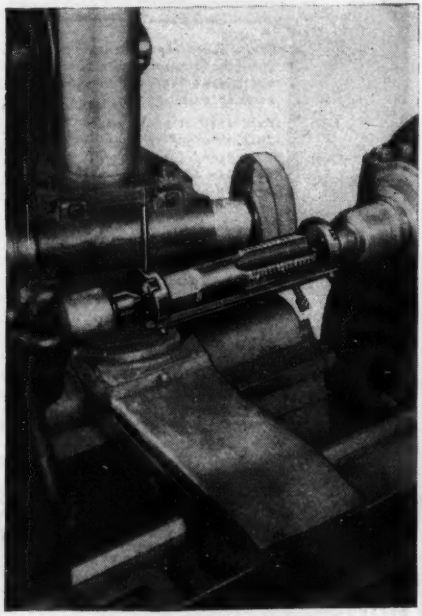
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Company .....

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tric swing for grinding identical chamfer and relief on each flute. A set screw is used to hold the tap firmly in position while grinding each flute.

For regrinding taps with bench type grinding machine, the Minn-Kota Tap Grinding Tool can be supplied with a special universal fixture which is adjustable for any type of bench grinder. This fixture holds the Minn-Kota Tool in proper position for grinding tap and, when once adjusted to grinder, need not be changed.



Minn-Kota Tap Grinding Tool in Use in Lathe with Tool Post Grinder

Fairbanks-Morse Protected Polyphase Squirrel-Cage Motor

An all-purpose, continuous duty, polyphase, squirrel-cage, induction motor is announced by Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago, Ill. Constructed with exclusive centrifugally-cast F-M Copperspun rotor, the motor is fully protected against flying chips,



for POSITIVE, DEPENDABLE LUBRICATION
under all conditions

Over 30 years of specialized research, designing and manufacturing of every conceivable type of lubricator, is your guarantee of a scientific answer to all of your lubricating problems. Gravity Feed, Wick Feed, Constant Level and Multiple (manual and automatic) Oilers, Oil and Grease Seals are fully described in Catalog No. 60—write for your copy.

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DAYTON SAFETY LADDERS
have every advantage

No extra man needed to steady—Roomy platform for men and tools. Great strength, lightweight. Guard rails on platform—Automatic locking. Folds compactly

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Airplane spruce is used throughout. Steel braces. Safety shoes. Sizes 3' to 16' in height—Elevating platform adds extra height to Dayton Ladders. *Write today for prices, catalog.*

DAYTON SAFETY LADDER Co.
121 - 23 THIRD ST. CINCINNATI, OHIO

18 WAYS TO SAVE TIME & MONEY *with the* MEAD *Industrial Burring Machine*

New circular explains, illustrates 18 ways in which the Mead Industrial Burring Machine saves time and money—also contains special Grit Guide. Every industrial plant needs this "Jack-Of-All-Trades" machine. Your burring can be done in "free time"—Install these machines by every machine tool which leaves burrs. Grinds, finishes both outside and inside cut-out openings. Immediate delivery in most cases. Write for the informative Money-Saving circular now.





For Metal—Plastic—Wood.

MEAD Specialties Co.
15 S. MARKET
Dept. 123-A
CHICAGO 6, ILL.

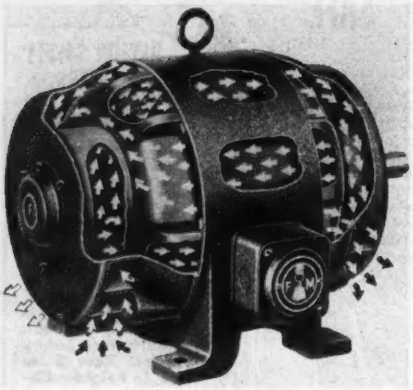


Illustration of Fairbanks-Morse Protected Polyphase Squirrel-Cage Motor Showing Cross-Flow Ventilation Feature

falling particles, dripping liquids, and so on. Ball bearings are sealed in cartridge-type housings, thus minimizing shutdowns due to bearing failures. Cross-flow ventilation, a feature in frames 224 to 365 inclusive, is obtained through the use of protected inlets and exhausts at each end of the motor, thereby resulting in uniform cooling and the elimination of hot spots.

Regardless of the position of the motor, complete safety for the operator is said to be assured since there are no moving external parts. The frame is cast in one piece with rib sections to give added strength without increase in weight.

The Fairbanks-Morse Protected Polyphase Squirrel-Cage Motor is said to incorporate an innovation in conduit boxes. Where space is limited, the conduit can be brought up between the motor feet to a tapped hole in the motor frame and the conduit box cover assembled flush with the frame. The external box is then discarded. When the conventional conduit box is used, it can be mounted in any one of four positions.

The motor is rated 40 deg. C. and is designed to carry 115 per cent load continuously without injurious heating.

Willson Saf-t-Bra

As means for further protecting women engaged in industrial work from

MASTER GAUGES

Put JAP KILLING on a PRODUCTION BASIS . . .



Manufacturers of:

THREAD PLUGS
THREAD RINGS

PLAIN PLUGS
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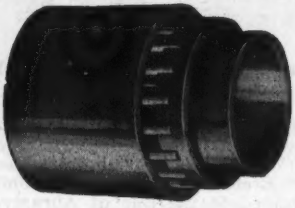
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358 FURMAN ST.
BROOKLYN, N. Y.

MANY PATTERNS, ALL WITH SAME KNURLS!



ADJUSTABLE KNURL HOLDER



This tool fits lathe turret and is adjustable to produce all standard knurlings using only straight cut knurls. Capacities up to 2½" dia. of work. Shank to fit your turret.

Request Illustrated Price Circular

GRAHAM MFG. CO.

37 BRIDGE ST. EAST GREENWICH, R. I.



Rawhide PROTECTS

C/R MALLETS AND HAMMERS

permit forceful, effective blows without battering, scarring or marring. They protect fine finishes, delicate insulation, hardened parts and costly machinery. They far outlast other mallets, hold a true striking face and, because they absorb recoil, they are less fatiguing on continuous use operations (as pounding in winding, assembly work, etc.). Speed production—reduce spoilage. All sizes. Weighted or unweighted.

Replaceable Heads



Replaceable Insert Faces are available for C.R. Hammers . . . make each a "lifetime" tool.

CHICAGO Rawhide MFG. CO.

1281 ELSTON AVE. CHICAGO, ILLINOIS

painful injuries, Willson Products, Inc., Reading, Pa., has placed on the market a set of breast protectors of the type



Willson Saf-t-Bra

shown in illustration, to be known as the Saf-t-Bra. The protectors or cups are made of a durable plastic which is said to provide unusual resistance to impact and can be easily cleaned. Flesh colored and ventilated, the cups not only afford protection for the breasts but are designed so as to extend well back under the arms to prevent possible injury of the delicate and sensitive lymphatic glands.

Form-fitting so as to assure full comfort, the Willson Saf-t-Bra is available in three sizes—small, medium, and large.

Abrasive Red Band Diamond Tool No. 15

Designated as the No. 15, a diamond tool with exclusive numbering feature which is designed to eliminate the danger of careless disposal of diamonds has been added to the line of Abrasive Red Band diamond tools produced by Abrasive Dressing Tool Co., Detroit, Mich.

The tool, which is recommended for large-scale external straight-face grinding, contains 15 fine, whole, natural diamonds arranged in three layers of five each. The diamonds are precisely spaced and staggered to provide maximum contact with the wheel at all times. Clearly stamped on the head of the tool is a series of figures denoting the numbers of diamonds in each layer. As the tool

Send for this FREE Catalog



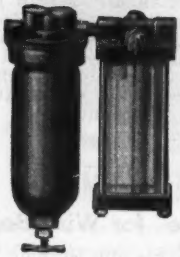
A wealth of information on cold-forged nails, rivets, screws and other items in hundreds of uncommon types. Specialties that will suggest to you how to improve the appearance or effectiveness of your product at minimum cost. Compiled by specialists in cold-forging since 1850.

JOHN HASSALL, INC.
Established 1850
394 Oakland St., Brooklyn 22, N. Y.



M-B AIR-LINE FILTER and AUTOMATIC LUBRICATOR

Removes 96% to 97% of All Water, Dirt and Scale from Airline.

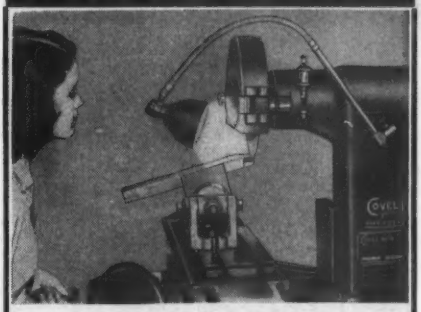


Air passes through a series of brass discs with .002 spacings, providing the finest degree of filtration obtainable by any known method. Then, as the air passes through head of Lubricator, oil is delivered into the purified airline in any desired volume.

M-B PRODUCTS

130-134 E. LARNED ST.
DETROIT 26, MICHIGAN

VIMCOLIGHT



Reaches Those "Hard-to-Light" Spots !

Despite general improvements in over-all plant lighting, many machine tool operations can be speeded up...errors reduced...operators' eyes spared needless fatigue...by the use of even-glowing, non-glare **VIMCOLIGHTS.** It's the light that "gets around the corners." Adjustable; inexpensive. Write for circular. **Vimco Manufacturing Co., 111 Chenango St., Buffalo 13, N. Y.**

NOW! IS THE TIME TO HAVE YOUR REID SURFACE GRINDERS REBUILT LIKE NEW!



We are pleased to announce that our rebuilding division, which, for the emergency period was reduced to allow for the increased demand for new surface grinders, is now ready to rebuild your machines.

Your REID grinders no doubt, have been subject to a steady pressure to give service to the war production need.

Why not rejuvenate them so that they'll be "good as new" again? Our expert workmanship on rebuilding is the reason why every machine, factory rebuilt, carries our full guarantee. Write your nearest dealer today for all particulars.



REID BROTHERS CO. INC.
BEVERLY, MASSACHUSETTS



is used, the number of diamonds remaining in the head is indicated through each stage of wear. In this manner, the danger of the tool being discarded before all of the diamonds have been completely used up is eliminated.

Diamonds are permanently set in the tool by means of an "Oxide-Free Process" which combines a new alloy and firing technique. This process is said to ensure useful life of diamonds until they are completely worn away, eliminating loosening and other disadvantages.

Gar-Bro "Shimble" for Wire Rope

A combination shackle and thimble for wire rope, to be known as the Gar-Bro

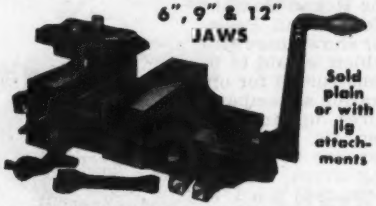


Gar-Bro "Shimble"

"Shimble," has been placed on the market by Garlinghouse Brothers, 2416 E. 26th St., Los Angeles 21, Cal. Forged from heated steel plate and shaped to the correct rope radius, the fitting is rigidly designed so as not to become distorted under load. If desired, the unit may be welded to other attachments or the side plates may be bent to meet special connection requirements.

THIS VISE IS A READY-MADE JIG OR FIXTURE!

6", 9" & 12" JAWS



Sold plain or with jig attachments

GRAHAM MULTI-PURPOSE VISE

Infinitely more useful than most vises, this tool serves plain holding requirements extra well (thanks to its parallel, flush, square design) and with its attachments and special jaws serves a variety of repeat-operation needs on drill press, radial, miller, planer, shaper, grinder. Sizes up to 122 lbs.

Request Illustrated Price Circular

GRAHAM MFG. CO.

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MARK IT QUICKLY with a NUMBERALL

Made in 1 to 10 wheels. Stamp in perfect alignment. Shank for Hand or Press Stamping. Platform for stamping Name Plates and other small articles.



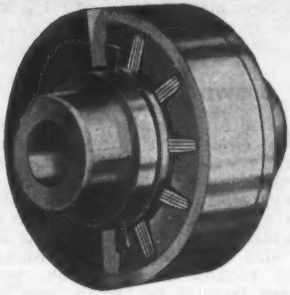
NEW Quick Set Machine. One wheel can be turned quickly by knurled knob for consecutive numbering.

NUMBERALL STAMP & TOOL CO.

Huguenot Park Staten Island, N. Y.

USE CUSHION TORQUE

—IT INCREASES OUTPUT



Kanti-Lever Coupling

If you want steady, uninterrupted production . . . lower machine-repair costs . . . freedom from bearing troubles and shutdowns caused by misalignment, then take advantage of the CUSHION TORQUE developed by the KANTI-LEVER COUPLING. It not only protects you against the evils of misalignment like the ordinary Coupling, but it goes several steps further and protects your Motors and Productive Machinery against the wear, vibration and fatigue that are the source of most machine failures. There is no other Coupling like the KANTI-LEVER . . . it has radial resilient driving spokes of laminated, spring-tempered, 200,000 lb. steel which operate in taper-side slots . . . leverage on the spokes automatically decreases as the load increases . . . no end thrust can develop . . . protective stops prevent damage to the spokes from extreme overloads. Over 3,000,000 H.P. in service.

Send for Bulletin No. 28-M.

BROWN ENGINEERING CO. 120 N. THIRD ST. READING, PA

Made with open and closed ends, the Gar-Bro Shimble is readily adaptable to guy anchorages, tractor hitches, crane slings, equalizers, boom topping, turnbuckles, and so on. The fitting is available in rope sizes from ⅜ to 1⅝ inches.

Brown Air Regulator

Available for installation on air tanks, air lines, equipment and machinery requiring very accurate, dependable control and adjustment of air, an air regulator especially designed to meet the critical standards of the U. S. Navy is now being offered by the W. R. Brown Corp., 5725 Armitage Ave., Chicago 39, Ill. By means of the unit, working pressures from 0 to 140 lb. can be obtained from air lines or storage tanks with initial pressures up to 250 lb. Pressure is said to be maintained uniformly once reduced pressure is selected.

The operating mechanism of the Brown Air Regulator is simply constructed so as to assure long life, trouble-free operation, and is said to be unaffected by oils or water. Regulator can obtained with or without gage, as desired.

Regan Radiant Heater and Resistor

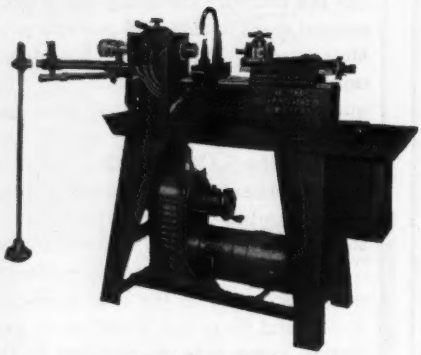
Techtman Industries, Inc., 828 N. Broadway, Milwaukee, Wis., announces the Regan Radiant Heater and Resistor shown herewith which is said to be constructed for operation at temperatures up to 1,700 deg. F. Designed for use in annealing ovens, electric furnaces, and so on, wherever high temperature radiant heat is required, the element consists of a helical coil of nickel-chrome wire wound spirally around a refractory coil. The binding posts and straps are made of Monel metal or nickel-chrome, depending upon the specifications of the user.



Regan Radiant Heater and Resistor

The Regan Radiant Heater and Re-

STEVENS



— ALSO MAKERS OF —

Screw Slotters
Rotary Tables
Multiple Spindle Centers
Milling Machine Vises

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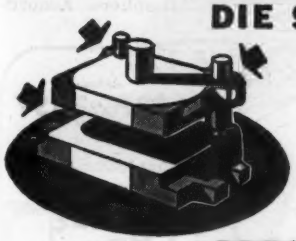
Screw Machines

Built in two sizes with Stepless Speed Variations up to 2400 revolutions. Motor driven with convenient electric controls for efficient operation. Other salient features are

- SIMPLE AND DURABLE CONSTRUCTION
- MEANS FOR RE-ALIGNING TURRETS
- EASE IN OPERATING
- MOTOR-DRIVEN COOLANT PUMP
- LARGE CHIP AND OIL CAPACITY
- MAGNETIC BRAKE
- ALL PARTS ACCESSIBLE
- SAFETY

JOHN B. STEVENS INC.
482 CANAL STREET
NEW YORK 13, N. Y.

DANLY **PRECISION DIE SETS**



THEIR PRECISION

Means Greater Accuracy In Your Production

Danly Commercial Sets

Danly Special Sets

DANLY MACHINE SPECIALTIES, INC.
2100 S. 52nd Avenue, Chicago, Ill.
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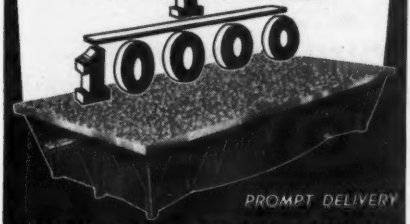
DANLY PRECISION DIE SETS

REJECTIONS, WHY?
Are they due to Production or Standards?

You Can Rely on

SMITH *MASTER* Surface Plates

FLAT TO 1/10000 OF AN INCH



PROMPT DELIVERY

SMITH TOOL & ENGINEERING CO.
855 N. Sandusky Ave., Bucyrus, O.



Give them the **BEST** *tools*

To maintain the tempo of production in American war plants, workmen MUST be equipped with the tools that will permit them to keep pace with requirements. Skilled, experienced men on metal-sawing jobs *prefer* VICTOR Hack Saw Blades. There are VICTOR Blades for sawing aluminum, copper, brass, steel and steel alloys in tubes, flat stock, bars and angles.

The efficient and well stocked toolroom should carry a supply of VICTOR Blades. For fast cutting jobs, the high-speed steel "MOLY" Type* blade is recommended; for tough jobs in awkward positions, the Unbreakable Special Flexible is suggested.

**T.M. Reg. — Blades bearing the name "MOLY" are made only by VICTOR SAW WORKS, INC., and affiliated companies.*



VICTOR SAW WORKS, INC.
MIDDLETOWN • NEW YORK
Makers of Hack Saws, Frames, Band Saws and Power Saws

sistor is available in a range from 32 to 220 volts.

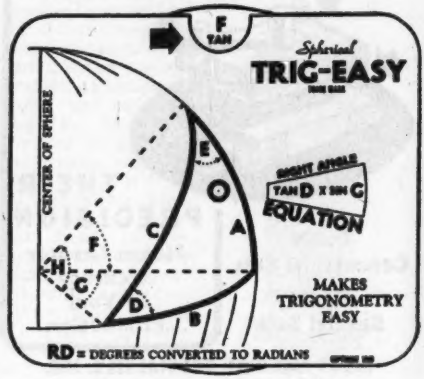
"Speedaloy" for Metal Cutting

A cast tungsten-chromium-cobalt alloy for high speed metal cutting, to be known as "Speedaloy," is now being offered by Tungsten Alloy Mfg. Co., 65 Colden St., Newark 4, N. J., in the form of solid tool bits, flats, and tipped tools.

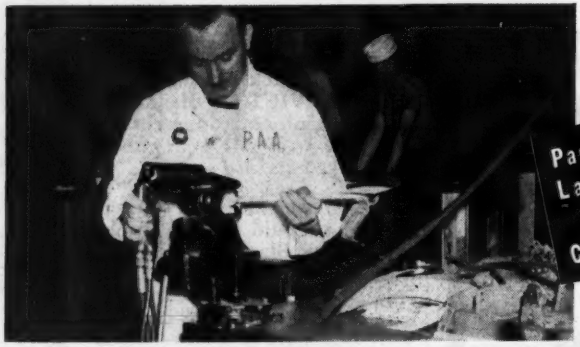
Speedaloy is said to possess long wearing qualities and unusual resistance to shock. According to the manufacturer, Speedaloy tools can be used for machining all metals with the exception of manganese steel and chilled iron, proving particularly suitable for chromium and nickel alloys, including stainless steel.

Spherical "Trig-Easy" Chart

A "Trig-Easy" chart for spherical trigonometry is now being marketed by E. H. Needham, Trig-Easy, Dept. 3-E, Culver City, Cal. The chart is designed to provide solutions to 36 intricate equations on the surface of a sphere. According to the manufacturer, it can be used for finding the radius of an arc or the length of the arc from the radius. On one side of the chart are found the equa-



Spherical "Trig-Easy" Chart



Pan American Airways, La Guardia Field, is equipped with COLUMBIAN VISES

SAFE in the Jaws of COLUMBIAN VISES

From the most delicate aircraft part to a heavy forging, it's safe in the jaws of Columbian Vises. Industry has learned to depend upon Columbian Vises. They are carefully machined to provide positive and accurate work on the most exacting job—they assure additional working strength, positive gripping efficiency, maximum capacity and easier operation. Your Columbian distributor is always ready to help you.

ARMY E NAVY

Awarded April 8, 1943
Star Added October 8, 1943

WAR BONDS FOR VICTORY

THE COLUMBIAN VISE & MFG. CO.

9026 BESSEMER AVE. CLEVELAND 4, OHIO

The World's Largest Makers of Vises



Save Time on WAR ORDERS
with a
BEVERLY Throatless SHEAR

If you're cutting straights or irregulars on "War" jobs, you can speed 'em up with a BEVERLY. Write for sizes and prices now!

BEVERLY SHEAR COMPANY
3004 W. 111th St. Chicago, Ill.

STEEGE MOTOR DRIVES FOR DEFENSE GUARANTEED FOR FIVE YEARS

No chance of breakdown, doing a good job powering machines for defense production. No noise, floating cone, results 100% power. 8 years of production proof of durability. Easily installed.



PRICED AT $40 AND UP.

FOR LATHES, SHAPERS, MILLERS, ETC. IMMEDIATE DELIVERY.

Send for descriptive pamphlet.

W. L. STEEGE MACHINERY CO.
102 JEFFERSON ST. CHICAGO, ILL.

BUILDERS 'T' SURFACE GRINDER



The spindle of the BUILDERS 'T' Surface Grinder, of super-precision type with a large, taper bronze front bearing, ball thrust and radial ball rear bearing, similar to that used on many large automatic precision surface grinders, offers extremely accurate surfacing with a fine quality finish.

Delivery can be made promptly.
Bulletin 644 on request.

BUILDERS IRON FOUNDRY
19 Codding St. Providence 1, R. I.

SIMPLE · INEXPENSIVE · ACCURATE

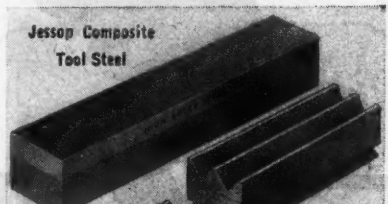
tions of the right spherical triangle; the equations for the oblique spherical triangle are on the other side.

The Spherical Trig-Easy is printed in four colors to ensure accurate reading. Solid black lines indicate the spherical triangle on the surface of the sphere, with red, green, and blue lines indicating the triangles that are created by the extension of the radii from the corners of the designated spherical triangle to the center point of the sphere. A 16-page pamphlet covering its use in detail is supplied with the chart.

Jessop Composite Tool Steel

Savings of high speed and other alloy steels ranging from 50 to 80 per cent per tool are said to be effected through the use of a composite tool steel now being produced by the Jessop Steel Co., Washington, Pa. This composite steel consists of a section of alloy steel continuously and permanently bonded to a backing of mild steel. The proportions of the alloy section are controllable.

The illustration herewith shows Jessop Composite Tool Steel in the form of a bar which has been machined, along the entire length, to specifications for a forming tool. It is then cut into the desired lengths for individual tools.



Jessop Composite Tool Steel

Other Jessop steels produced by this patented method include composite die section steel and stainless-clad steel.

Start Precision Jobs with R and N Taps —get proven results

— SERVICE —

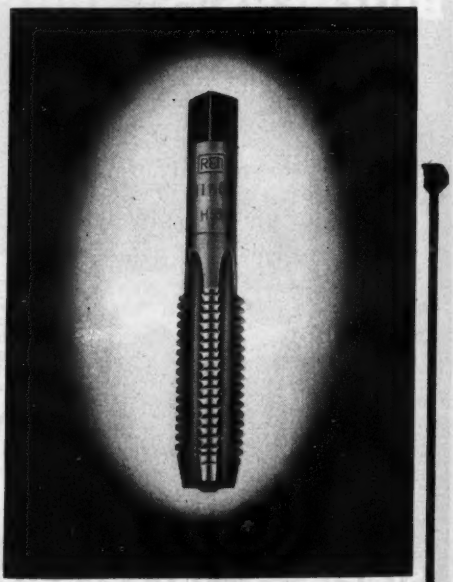
For vital war jobs we deliver Standard or Special Taps **ON TIME.**

With our expanded plant capacity, we have made an outstanding record for keeping delivery dates.

More than thirty years' experience in making fine production tools for leading manufacturers is assurance of R&N high quality.

REIFF and NESTOR CO.

LYKENS, PENNA.





STANDARD D-4 Abrasive Band Grinder

● This new, streamlined bench type grinder assures fast, quality finishing on metals, plastics, wood fibre . . . at low cost. Built to machine tool specifications, Standard D-4 is equipped with improved band tension control and specially designed protective motor hood. 4x36¼" band. The ideal portable unit.

OTHER STYLES AND SIZES IN NEW BOOKLET ON FINISHING—WRITE TODAY

WALLS SALES CORP.
96 Warren St., New York, N. Y.

WHEN EVERY SECOND COUNTS

"THE TOOLMAKERS BEST FRIEND"



This small tool steel job was sawed on the Grob Open End Band Saw in record time. Die illustrated with four openings completed in 12½ minutes including change over from opening to opening. Write for our catalog full of hints on saving many precious minutes and hours with the help of Grob's exclusive principle of Band Saw set-up.

GROB BROTHERS
GRAFTON, WISCONSIN

The JEEP OF THE TOOL ROOM



. . . a tough little precision machine that keeps you from getting

BOGGED DOWN

Compact, simple in design and the versatility for quick change-over . . . that's why so many small but vitally important jobs can be scheduled for the Linley . . . the

HIGH-SPEED VERTICAL MILLING *and* JIG BORING MACHINE

Eight spindle speeds, 275 to 4250 r.p.m. and direct micrometer setting, which eliminates the frequent errors of pencil figuring. Presents opportunities for handling a wide variety of die work, jig and model making, metal patterns, drilling, reaming, milling . . . quickly, accurately and economically.

Free your larger machines for all heavier work . . . Save time and power.

Bulletin sent on request.

LINLEY BROS. CO.
661 STATE ST. EXTENSION
BRIDGEPORT 1, CONN.

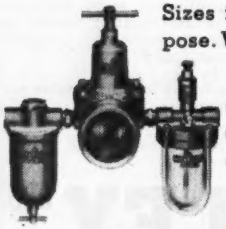


CAN YOU TAKE IT?

★ If your air tool is giving you a rough ride, tame it with the Norgren LUBRO-CONTROL UNIT. Oil the air that drives it and enjoy a smooth ride.

Air-Line Lubrication

Automatic; starts and stops with machine. Sight feed: You know it's working properly. Sizes for every purpose. Write for information to . . .



C. A. Norgren Co., Denver, Colorado

Norgren

"Multi-Mark" Product Identification Service

Facilities for producing permanent designs, illustrations, markings, dials, gages, scales, insignia, instructions, trade marks, and so on, on metal, glass, wood, and plastic have been developed by the Multi-Mark Division, Colonial Process Supply Co., 134-142 W. 23rd St., New York, N. Y. Markings can be produced on any surface in one or many colors with paint, lacquer, ink, or synthetics and are said to comply with government regulations for wear, weather and acid-resistance.

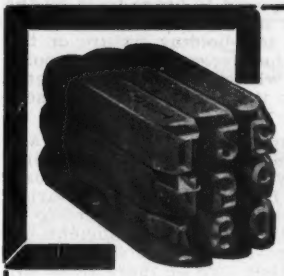
In addition to this complete marking service, the company also offers Multi-Mark Screens directly to manufacturers wishing to perform marking operations in their own plants. These screens can be used without special machinery and are supplied complete with all necessary instructions. They can be made up from any copy, large or small, and there is no limitation on size in either direction.

Carboloy Electronic Brazing Engineering Service

Commercial availability of electronic induction equipment for the routine brazing of carbide tools using any suitable brazing medium, including copper, is announced by the Carboloy Co., Inc., 11143 E. 8 Mile Rd., Detroit, Mich. Arrangements have been concluded whereby the national service organizations of both Carboloy and the General Electric Company will cooperate in assisting manufacturers using the equipment. Complete instructions as to coil types and time cycles for the usual forms of carbide tools will be furnished users by the Carboloy engineering department. With such information, the operator merely attaches the correct coil for the tools to be brazed, sets the control dials on the oscillator to the proper values as to current and time, and pushes a button.

The induction tool-brazing equipment is based on a line of General Electric high frequency (500,000 cycle) electron tube oscillators which are available in 5 and 15 kw. output ratings. The selection of the correct unit for any given installation is dependent upon the sizes and quantities of tools to be brazed. The 15 kw. unit is designed to accommodate larger sizes of tools as well as the brazing of production quantities of smaller tools. The 5 kw. unit is designed primarily for smaller sizes of tools.

In addition to the oscillator, the only



COLLECT ON STAMPS

You COLLECT when you use THOR STAMPS—because their correctly-heated alloy steel assures more marks per dollar. Central striking point gives uniform indentation. Thumb side-marking makes them easily read—easily used.

WRITE FOR CATALOG.

The Pittsburgh Stamp Co.

812 CANAL ST. • PITTSBURGH, PA.

SHELDON ARBOR PRESSES

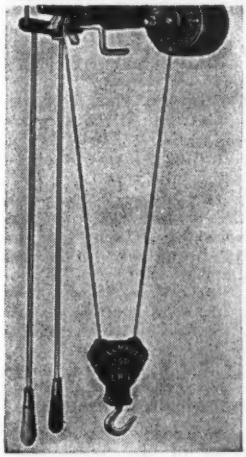
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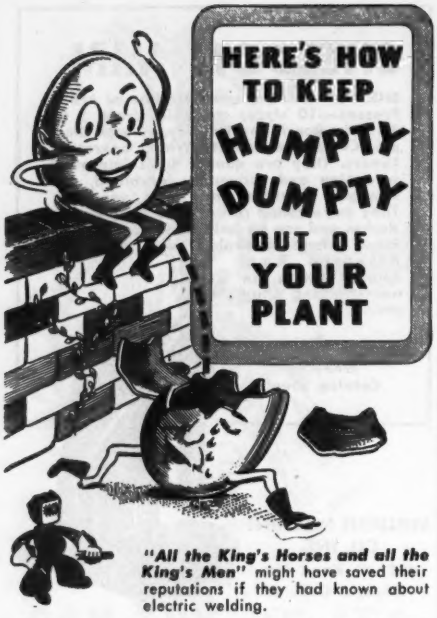
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NEW BOOKS

How to Think Up. By Alex Osborn. Published by the McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York, N. Y. 38 pages. Cloth binding, board covers. Price, 50 cents.

Written in an interesting, easy-to-understand manner, this book provides an inspiriting discussion of why American ingenuity must be closely harnessed today to our industrial problems. It describes scores of valuable ideas that have come from men on the assembly line for speeding up production, effecting economies of time and effort, and saving materials; explains how these ideas were thought up, and sketches methods for stimulating the thinking up of ideas.

The five chapters of the book have the following headings: Who Can; What For; Solo Method; Group Method; How.

"Welding Stainless Steels." Published by the Allegheny Ludlum Steel Corp., Pittsburgh, Pa., this 64-page book is said to strike out along new channels

AUTOM



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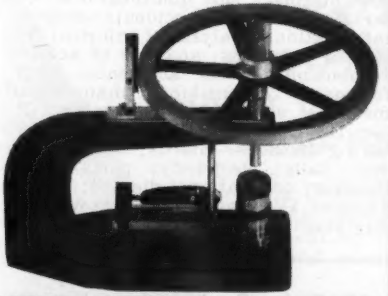
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to interpret the techniques commercially employed—and much more particularly, the precautions to be observed—in the welding of stainless steel by the accepted processes. The book includes many full-color perspective drawings and diagrams of an unusual type to illustrate the various methods used and the physical and chemical phenomena which occur (or must be prevented from occurring) when stainless steel is welded.

According to the publisher, the book attains new heights of clarity and educational value in its coverage of the subject. It provides elementary, practical instruction for the student or beginner in stainless steel welding and, at the same time, a complete technical explanation which will be helpful to production men, engineers, designers, or metallurgists engaged in problems of stainless steel fabrication or just in process of becoming acquainted with these alloys.

Chapter headings of the book are as follows: Effects of Heat on Stainless Steels; Metallic Arc Welding; Atomic Hydrogen Welding; Oxygen-Acetylene Welding; Electric Resistance Welding; Welding Pluramelt Steels. Copy of book will be sent free of charge to individuals addressing a request on their company letterhead.

"Foremanship and Accident Prevention in Industry," a 94-page textbook published by the American Mutual Liability Insurance Co., Boston, Mass., is designed to provide a solution to one of the perplexing problems of industrial management; namely, that of teaching foremen their responsibilities. The book is said to be useful both for the training of new workers placed for the position of foremen and for the further schooling of foremen of long experience.

Illustrated throughout, the book is divided into seven chapters as follows: Chapter I, The Foreman in Industry—industrial organization; the foreman's job; his place; his qualifications; Chapter II, Causes of Accidents—sources of information; analysis of injuries; definition of accidents; analysis of accidents; responsibilities for accidents; limit of foreman's responsibility; manufacturing methods; supervision leadership; Chapter III, Accident Control in Manufacturing Methods—guards; handling material; falls; electricity; portable tools; lighting; occupational disease; planning; Chapter IV, Maintenance—power driven equipment; manually operated equip-

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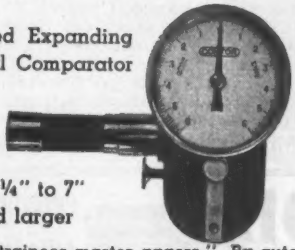


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ment; plant; elevators; painting; temporary hookup; inspections; ropes and cables; rubber goods; electric motors; solvents; chemicals; vehicles; belting; Chapter V, Housekeeping — planning; store room; refuse and waste; miscellaneous maintenance; Chapter VI, Personnel Control in Accident Prevention — specifications; selections; training; recognition of skill; women in industry; Chapter VII, Aids to Foremen — plant safety organization; departmental committee; safety engineer; safety inspection; shop steward; first aid; educational material; competition; the foreman's investigation of accident.

While the primary purpose of the book is to provide industrial policyholders of the company with an added safety engineering service, sample copies are being made available to executives of any plants engaged in war work, addressing the American Mutual Liability Insurance Co., 142 Berkeley St., Boston, Mass.

DIX



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SHOP LITERATURE

Bristol Recording Thermometers. Bulletin No. T800 with 40 pages of useful and technical information on thermometry and thermometers has been published by The Bristol Co., Waterbury, Conn. The bulletin describes the company's line of recording thermometers, with considerable space given to the basic theory of the several types offered as well as practical information regarding ranges, charts, bulbs, and tubing available. Copy free upon request.

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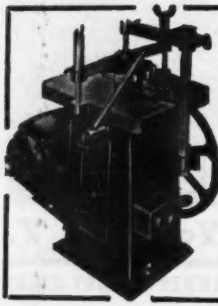


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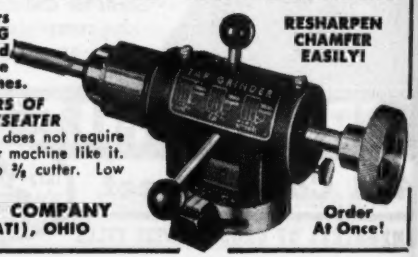
Carboloy Chip Breaker Grinder. A technical bulletin containing complete specifications of a new high capacity flexible chip breaker grinder has been made available by the Carboloy Co., Inc., 11143 E. 8 Mile Rd., Detroit, Mich. Included in the bulletin are photographs and descriptions of how to use the machine for grinding both angular and parallel type chip breakers as well as for grinding breakers in roller turner tools. Also shown are setups for using the machine in grinding boring bits and flat form tools. Prices of the grinder with and without pedestal as well as accessories available are listed. Copy of Bulletin GT-158 free upon request.



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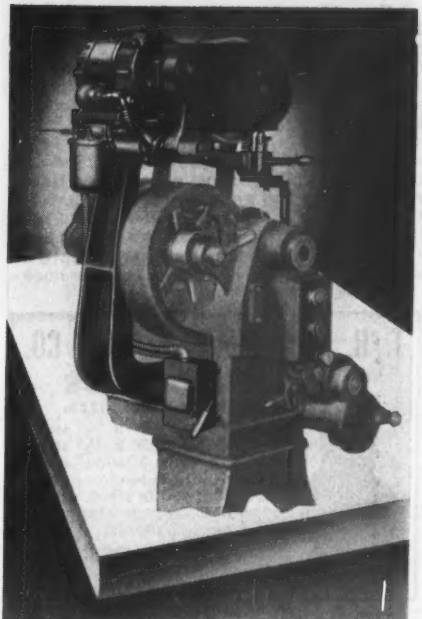
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"The ABC of Electronics at Work." The fundamental principles of the six basic ways in which electronic tubes function are explained in a 36-page booklet, "The ABC of Electronics at Work," announced by the Westinghouse Electric & Mfg. Co. Schematic drawings of tube construction and diagrams showing typical circuits for the various functions are used to explain how electronic tubes rectify, amplify, generate, control, transform light into current and current into light. Industrial and military applications for each of the six basic functions are described and illustrated in the booklet, copy of which can be obtained by writing to Department 7N 20, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., and requesting Booklet B-3260.

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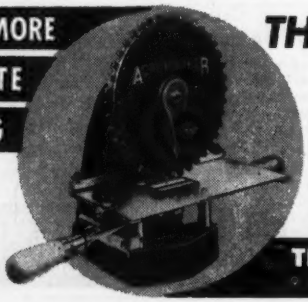
6 Broadway New York, N. Y.

"DoAll Precision Saws" is the title of a 44-page booklet released by The DoAll Company, 1201 Thacker St., Des Plaines, Ill. The booklet contains information on the workings of the saw testing and research divisions of the DoAll Contour Saw Laboratory, including illustrations and explanations of representative customer tests that have been conducted in the laboratory. Complete data regarding cutting rates, length, width, set, temper, and types of DoAll Precision Saws is given. Additional helpful information concerning the selection and use of DoAll Saws is also included in the booklet, copy of which is available to executives free upon request.

G-E Cabinetrol, a simplified system for providing motor control for complex industrial processes, is the subject of a 24-page illustrated bulletin issued by the General Electric Co., Schenectady, N. Y. The bulletin tells how most control systems can be built up by combining standard control units and accessories into the required number of Cabinetrol sections. The bulletin also lists the many uses of the Cabinetrol and describes in detail how the equipment is manufactured.

A section of the bulletin is devoted to a set of layout tables which show how simply most installations can be made, while another section lists the compartment sizes of the standard Cabinetrol units. Copy of Bulletin GEA-3856 free upon request.

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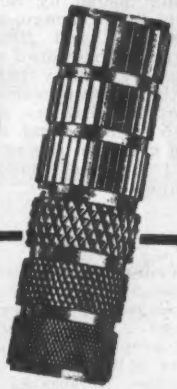
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Sciaky PMCO 2S-5 Electric Resistance Welder for aluminum and its alloys is the subject of a 16-page bulletin now being issued by Sciaky Bros., 4915 W. 67th St., Chicago 38, Ill. The bulletin describes and illustrates the Sciaky principle of stored energy with preheating, the Sciaky variable pressure cycle with precompression, electrical and mechanical features of the Sciaky PMCO 2S-5 Welder, and so on. Specifications are given on the back page of the bulletin. Copy of Bulletin 101-B free upon request.

Federal Gage Instruction Booklet. Of interest to persons using the Federal Model 1201 Series Centralizing Hole Gage is an eight-page instruction booklet prepared by Federal Products Corp., 1144 Eddy St., Providence, R. I. The booklet illustrates and explains in detail how to properly handle this particular gage, how to read the gage, how to set the gage, and so on.

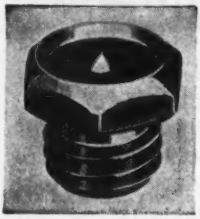
Copy of booklet will be sent free of charge to users of Federal Model 1201 Series Centralizing Hole Gages addressing a request on their company letterhead.

Sheffield No. 100 Series Precision Thread Grinder for producing single or multiple right or left-hand threads with any pitch up to 6 t.p.i. is the subject of a 12-page bulletin prepared by The Sheffield Corp., Dayton 1, Ohio. The bulletin fully covers the various construction features and operations of this unit and lists specifications in convenient form. Copy of Bulletin M 100-143 free upon request.

"Stediflo" Hydraulic Pressure Pumps. An eight-page bulletin fully covering its line of "Stediflo" Hydraulic Pressure Pumps has been issued by The Watson-Stillman Co., Roselle, N. J. Illustrations show several of the more popular models of pumps as well as important construction parts. Also included in the bulletin are a full-scale sectional elevation drawing of Stediflo Pump, a table giving dimensions (in inches) of the several sizes of pumps, and a table of specifications that covers details of each model and size.

Copy of Bulletin 250-A will be sent free of charge to individuals addressing a request on their company letterhead.

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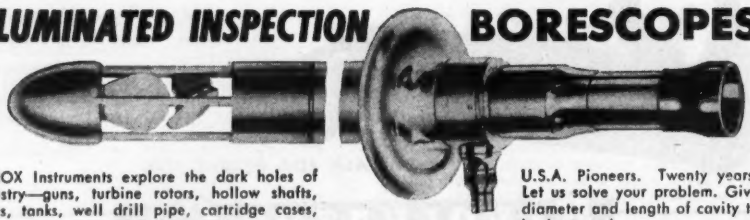
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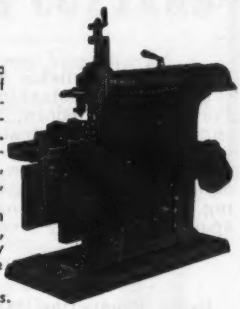
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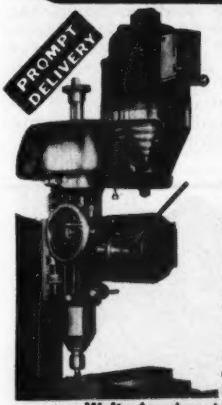
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Sharpen Straight or Angular Fluted Tools— Gun or Spiral Point Taps — End Teeth of End Mills — Similar Tools With Evenly Spaced Flutes.

Both types complete—no extra parts. Each available in three sizes—All heads arranged to sharpen tools with 3 different numbers of flutes. Standard or special arrangements if required.

TOOLS HELD IN PRECISION COLLETS. Can Be Sharpened Or Salvaged After Center Is Destroyed.

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1279 W. Third St. Cleveland 13, Ohio

"Safety Speeds Production," a 24-page pamphlet published by the Division of Labor Standards, U. S. Department of Labor, has been prepared in response to widespread requests from management faced with the current shortage of experienced supervisory employees, especially those with any training in safety. Directed to supervisors, the material was compiled from the experiences of hundreds of foremen and was reviewed for accuracy and usefulness by safety engineers in large war plants acting as representatives of the Labor Department's National Committee for the Conservation of Manpower in War Industries.

Copy of pamphlet can be obtained by writing to the Division of Labor Standards, U. S. Department of Labor, Washington, D. C.

"Hy-Mac" Bulletin SM 843. Released by Hydraulic Machinery, Inc., 12825 Ford Rd., Dearborn, Mich., this four-page bulletin illustrates and describes various models of "Hy-Mac" flame hardening machinery as well as special machinery for molding, bending, broaching, two-way drilling, piercing, and spot-facing. Copy free upon request.

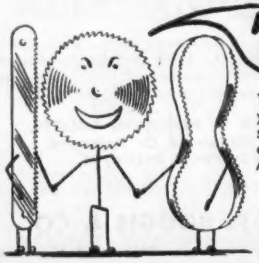
Delta Production Machine Tools. The Delta Mfg. Co., 602 E. Vienna Ave., Milwaukee 1, Wis., has published a 52-page illustrated catalog presenting its line of production machine tools and accessories. Copy of Industrial Catalog 11 can be obtained free of charge thru Delta industrial distributors or by writing direct to The Delta Mfg. Company at the above address.

"ARMCO Aluminized Steel" is the title of a concise booklet published by The American Rolling Mill Co., Middletown, Ohio. Intended as a guide to the use of aluminum-coated steel, the booklet gives gauge and weight limits and information on the qualities and characteristics of the recently-developed sheet which is said to combine the surface qualities of aluminum with the strength of steel. Physical and chemical properties and welding methods are also described in the booklet, copy of which is available free upon request.

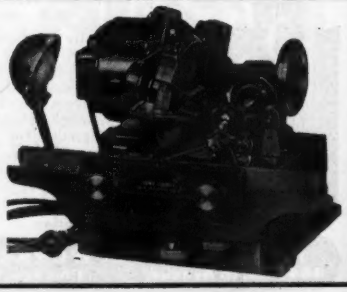


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MAKES OLD DRILLS LIKE NEW
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If you are having spoilage losses due to oversize or bell-mouthed holes, there's a simple way to remedy the situation. Do as others are doing and change over to the Ziegler Floating Tool Holder!

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REAMERS and many other cutting tools, formerly in the "special" class are now STANDARD with us. The majority of these STANDARD cutters is in stock *most of the time.* Our broad line often enables the consolidation of tool orders and saving of valuable time. Each W-S tool is tipped with the correct grade of carbide best suited to do a cutting job on the metals for which the tool was ordered. Carbide tipped tools are not just a specialty with us . . . we make them *exclusively.* You can *expect* and *get* uniform, high quality results with W-S tools. Write for new FREE Catalog 144 and latest prices.
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SAVE TIME . . . wire or phone your requirements!

W-S Carbide Tipped Core Drills available in straight and tapered shanks. Sizes: ½ to 1½.



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CARBIDE TIPPED CUTTING TOOLS
CENTERS • DRILLS • CORE DRILLS • COUNTERBORES • SPOT FACERS • END MILLS • REAMERS
HOLLOW MILLS • LATHE BITS • SPECIAL TOOLS

Hammond "OD" Cylindrical Finishing Machines for tubes, rods, bars, and various other cylindrical shapes from ¼ to 9 inches outside diameter are illustrated in a six-page bulletin released by Hammond Machinery Builders, Inc., 1615 Douglas Ave., Kalamazoo 54F, Mich. The bulletin describes and features the relatively standard unit which can be adapted for use with either grinding, polishing, or buffing wheels or arranged for contact wheel and abrasive belts with Hammond's patented backstand idler. Copy of Bulletin No. 502 free upon request.

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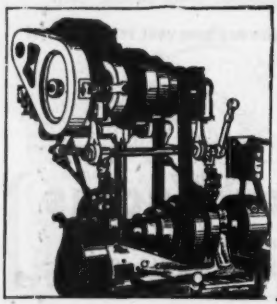
HUDSON, N. Y.

WTTCo. Diamond Impregnated Dressers for use on external, internal, centerless, and surface grinders in performing rough, semi-finish, and finish dressing operations are covered in a four-page illustrated folder announced by Wheel Trueing Tool Co., Inc., 3200 W. Davison Ave., Detroit 6, Mich. Copy free upon request.

Spark Testing Guide. A 21 x 30-inch wall chart which is designed to serve as a guide for spark testing tool steels is now being offered free by The Carpenter Steel Co., 311 Bern St., Reading, Pa. Useful in segregating tool steel scrap, unscrambling mixed stocks, and checking the identity of tool steel before heat treatment, the chart describes and illustrates spark patterns caused by various alloying elements in tool steel, and also gives complete details on the fundamentals of spark testing.

Sommerfeld Lathes. A series of three colorful eight-page bulletins has been pubished by the Sommerfeld Machine Company describing the company's complete line of Sommerfeld Lathes — formerly known as "Pittsburgh" Lathes. Group I Bulletin describes and illustrates the many features of Sommerfeld Heavy Duty 27 and 32-Inch Lathes and 36-Inch Medium Duty Lathes. Group II Bulletin gives complete details on extra heavy duty 36-inch and heavy duty 42-inch lathes, while Group III Bulletin covers Sommerfeld 50-Inch and 60-Inch Heavy Duty Lathes.

Copies of all three bulletins may be obtained by writing to Sommerfeld Machine Co., Box 286, Braddock, Pa.



Shockless speed changes --

without stopping motor—or without removing tool from cut with Remco Motor Drives installed. Less down time. More output. No tool marks. Motor takes hold gradually by slipping belt—simple friction-clutch action. Drive has rigid 3-point suspension, instead of customary one or two points. Easily installed, at very low cost. Write for folder. Remco Products Corp., State and Hay Sts., York, Pa.

REMCO MOTOR DRIVES

for LATHES, SHAPERS, DRILLS, MILLING MACHINES, etc.

Mahr Gas Fired Tinning Furnace. Illustrations, descriptions, and specifications of Mahr Gas Fired Tinning Furnace and Combination Oil Fired Tinning and Babbitting Pots are contained in Equipment Bulletin No. 280 now available free of charge from Mahr Mfg. Co., Division of Diamond Iron Works, Inc., Minneapolis, Minnesota.

"Multival" Lubricating System. An eight-page bulletin now being issued by The Farval Corp., Cleveland, Ohio, illustrates and describes a system for positively lubricating bearings of machine tools and other equipment regardless of location or condition. The system consists of multiple valve blocks to which oil or grease is delivered under pressure by means of a manually or power-operated portable gun. In the bulletin, the multiple valve blocks are pictured in phantom to show measuring and distributing mechanisms. Two pages are devoted to photographs and drawings of the various fittings by means of which the "Multival" system can be installed on machines. Copy of Bulletin No. 15 free upon request.

Fletcher Chip Wringers for reclaiming oil from metal chips are described and illustrated in a four-page bulletin published by Fletcher Works, Glenwood Ave and 2nd St., Philadelphia, Pa. Copy free upon request.

Ideal Maintenance Handbook. Ideal Commutator Dresser Co., 1031 Park Ave., Sycamore, Ill., now has available an 88-page handbook which tells how to keep motors and generators operating continuously at peak efficiency without dismantling. Designated as the No. 143, the handbook gives full details on the following Ideal portable maintenance products: commutator and slip ring resurfacers; commutator and slip ring precision grinders; commutator mica undercutters; commutator cleaning stones; commutator mica saws and milling cutters; carbon brush seaters; slotting files, and so on. Also included is illustrated and descriptive information on industrial electrical equipment, variable speed transmissions, machine tool accessories, wiring devices and tools.

Copy of Ideal Maintenance Handbook No. 143 free to executives upon request.

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(TRADE MARK) CEMENTED CARBIDES

Work 10 times longer between sharpenings





Carboloy-tipped scrapers speed up your scraping operations—eliminate all tendency to scratch or dig in—and last at least 10 times longer than steel scrapers. Only a few seconds required for resharpening, using a diamond wheel. No hand stoning required. In recent independent tests at a leading research institute, covering all materials scrapeable, Carboloy-tipped scrapers averaged 75 sq. in. per sharpening as against 6½ sq. in. with steel scrapers.

For best results on rough and finish surface scraping, use Carboloy-tipper scrapers. Write for folder A-100 and prices. Manufactured by

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General Electric Gear-Motors are featured in a 16-page illustrated bulletin designated as the GEA-1437D which has been released by the General Electric Co., Schenectady, N. Y. The bulletin describes the many types of gear-motors now furnished by General Electric, lists their advantages, and indicates the various locations where their use is most desirable. The bulletin also contains descriptions of the mechanical features and electrical characteristics of these motors as well as charts showing their horsepower-speed ratings. Copy free upon request.

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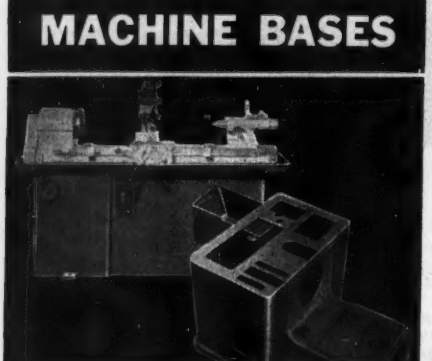
Wooster Pike Cincinnati, Ohio

Barco Mechanite Surface Plates are pictured and described in a four-page bulletin now being issued by the Barco Scraping Co., 1975 E. 65th St., Cleveland, Ohio. Illustrations show various applications for the plates, which are available in a wide range of sizes. Copy of bulletin free upon request.

Wiedemann Hand-Operated Turret Punch Presses Types R-2 and R-4 for short run piercing of sheet metal are fully covered in a four-page illustrated bulletin designated as the No. 24 which is now being offered free by the Wiedemann Machine Co., 1821 Sedgley Ave., Philadelphia 32, Pennsylvania.

Sterling Stainless Steels. The Firth-Sterling Steel Co., McKeesport, Pa., now has available a series of three illustrated bulletins which thoroughly cover Sterling Stainless Steels Types "A" and "B," Type "T" and "FC," and Types "18-8," "18-8-FC," and "18-8-S" respectively. Copies of bulletins free upon request.

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Any size or shape can be made in our modern plant. 61 years experience forming and fabricating plate and sheet steel is your assurance of quality products. Send blueprints.

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GREATER PRODUCTION CAPACITY



Provides positive rapid adjustment to meet the rigid requirements of production tool manufacturing. Built for continuous service. Adjustable coolant system. Large work tables instantly adjustable without wrenches or other tools. One-third H.P balanced precision bearing motor completely enclosed and radially mounted in rubber. Standard equipment: One 60 and one 100 grit 7" dia. steel backed silicon carbide wheels. Ideal for metal bonded or Resinoid bonded diamond wheels.

Order from your dealer or write direct. Request literature. No obligation.

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Bristol War-Time Instruments. The Bristol Company, Waterbury, Conn., announces a bulletin containing general information on its line of industrial instruments for controlling and recording war-time processes. Copy of Bulletin No. DM006 free upon request.

Holden Bright Temper and Clean Quench Baths. A four-page illustrated folder describing the Holden Bright Temper Bath for tempering steel parts with a clean metallic finish and the Holden Clean Quench Bath for quenching parts heated to high temperatures is now being offered free by The A. F. Holden Co., New Haven, Connecticut.

Cleco Riv-N-Jectors. A 16-page bulletin picturing and describing the Cleco Riv-N-Jector—a handy device for use in inserting rivets—and its application in the production of airplanes has been published by The Cleveland Pneumatic Tool Co., 3781 E. 77th St., Cleveland, Ohio. According to the bulletin, use of this device not only eliminates reasons for riveters dropping rivets in constructing aircraft, and so on, but also relieves them of the necessity of holding rivets in the hand during riveting operations. Copy of Bulletin 89 free upon request.

Mogul Metallizing Process and Equipment Catalog. The Metallizing Company of America, 1330 W. Congress St., Chicago, Ill., is now issuing a 40-page catalog containing complete information on Mogul Metallizing—a process for rebuilding worn metal parts, building up mismachined castings, filling blowholes in defective castings, and spraying exposed surfaces to make them corrosion resistant. The catalog illustrates and describes the application of this process by aviation, automotive, construction, power, shipbuilding, and textile industries, railways, mines, mills and refineries, foundries, and Diesel motor plants. Mogul equipment for metallizing is also pictured and described. In addition, questions and answers regarding metallizing are given at the rear of the catalog, copy of which is available free upon request.

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Just as Threadwell taps are now an important key to the rapid manufacture and assembly of the implements of war, so in years to come they will be the key to the mass production of cars, planes, radios, and dozens of other implements of peace which will raise the standard of living for every youngster now toting books to and from school.

Ask your Industrial distributor to explain why Threadwell taps are five ways better.

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TAPS OF DISTINCTION

THREADWELL TAP AND DIE CO., GREENFIELD, MASS., U.S.A.

Westinghouse Heat-Treating Atmospheres. Four basic heat-treating atmospheres—Endogas, Exogas, Monogas, and Ammogas—designed to speed up schedules and eliminate rejects are described in a 16-page booklet announced by Westinghouse Electric and Manufacturing Company. Providing nine variations of gases from which the proper atmosphere for any heat-treating process may be selected, these four basic atmospheres are said to meet all requirements of annealing, brazing, hardening, tempering, gas carburizing, sintering and normalizing.

The booklet explains the chemical reaction, composition cost, and application of each atmosphere as well as equipment needed. Charts for quick selection of atmosphere and equipment are provided. Illustrations include photographs of typical furnace applications, and schematic arrangement and flow diagrams for Endogas generator, Exogas generator, carbon dioxide remover for Monogas, and ammonia dissociator .

Copy of Booklet B-3251 may be obtained from Department 7-N-20, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pennsylvania.

"Instructions for Setting Up and Operating the Wilder Micro Projector" is the subject of a six-page illustrated leaflet published by the George Scherr Co., Inc., 130 Lafayette St., New York, N. Y. Included are a number of timely hints and suggestions that should result in making the projector more valuable to users. Various methods of preparing charts for the checking of angles, radii, tapers, and so on, are covered. Copy of leaflet free upon request.

American Monorail Overhead Handling Equipment. The American Monorail Co., 13107 Athens Ave., Cleveland 7, Ohio, now has available a 56-page catalog which describes and profusely illustrates the advantages and construction features of its various overhead handling equipment and the use of this equipment in aircraft plants, automotive plants, ceramic plants, foundries, chemical plants, machine shops, steel mills, metalworking shops, shipping yards and departments, and so on. Copy free to executives upon request.



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TIME — MONEY — SPACE
Saves time because all stock is in view. No looking around. Saves money because original cost is low. Saves space because very little required. 4 arm, 51" high, stacks 10,000 lbs. flat or round stock; 5 arms, 57" high, 12,000 lbs. Tubing less weight—3 stands for 20' lengths or 2 for 12' or shorter. Use against wall or back to back in center of room. Small cost—big value.
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MEAD BURRING MACHINE
It is a time, labor and money saver on innumerable jobs in any shop. Sharpens tools, cutters, etc., of many kinds.
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METAL CUTTER OR NIBBLER



GRAY, Originator of First Practical Metal Cutter or Nibbler
Most modern Nibbler for Template Cutting, Tool Rooms, Shipbuilding, Aircraft Parts, Aircraft Tubing, Sheet & Plate Shops.
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Parker Rod and Bar Marker for marking hexagon bars up to 3 inches, flat or structural shapes up to 3 inches square, and round rods up to 3 inches in diameter is the subject of a four-page bulletin released by The Parker Appliance Co., Cleveland, Ohio. Copy free upon request.

Northern "Travelator"—a device for motorizing hand traveled crane bridges up to 10 tons capacity—is fully illustrated and described as to construction and application in a four-page folder announced by Northern Engineering Works, 2601 Atwater St., Detroit, Mich. Copy free upon request.

Mahr Standard Heat Treaters of Unit Construction. Complete descriptions and specifications of Mahr Unit Type Standard Gas Fired Heat Treaters are presented in a six-page illustrated bulletin now being distributed by Mahr Mfg. Co., Division Diamond Iron Works, Inc., Minneapolis, Minn. Copy of Equipment Bulletin No. 120-B free upon request.

"Facts About Anti-Friction Bearings" is the title of a 32-page booklet issued by the Ahlberg Bearing Co., 3065 W. 47th St., Chicago 32, Ill. Illustrated with 76 diagrams, 41 phantom drawings and photographs, the booklet explains in simple, easy-to-understand language the reasons for using bearings, the function of each type of bearing, how loads are transmitted, bearing designs and uses, and so on. Copy free upon request.

Beaver Pipe Tools. A 48-page catalog which provides a broader coverage of the Beaver line and more clearly dissects Beaver tools and machines for the benefit of the buyer than previously issued catalogs is now being offered by Beaver Pipe Tools, Inc., Warren, Ohio.

Designated as the No. 44, the catalog contains complete illustrated, descriptive, and tabular information on various types of pipe threaders, pipe cutters, pipe reamers, sawing vises, pipe and bolt machines, wheel-and-roller and knife cutoffs, die heads, portable power units, and other equipment and products. Copy free to executives upon request.

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ADAPTABLE TO ANY MACHINE.

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FEED BULLET CORES, SCREWS, PINS, WASHERS, BEARING ROLLERS, NUTS, RIVETS, SPECIAL PARTS.

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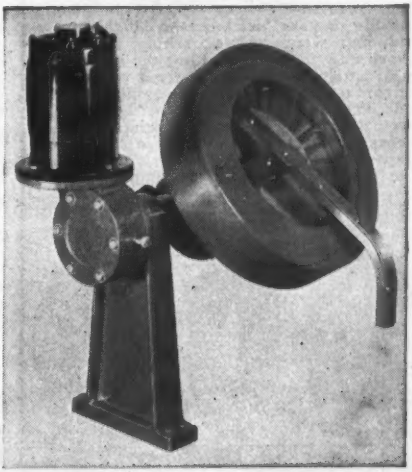
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Benchmaster 4-Ton Inclinable Power Punch Press for stamping, crimping, marking, punching, riveting, forming, and so on, is the subject of a four-page illustrated folder announced by the Benchmaster Mfg. Co., 2952 W. Pico, Los Angeles 6, Cal. Copy free upon request.

Rockford 12-Inch Hy-Draulic Slotter. An eight-page bulletin now being distributed by the Rockford Machine Tool Co., 2498 Kishwaukee St., Rockford, Ill., contains complete information concerning features, construction, and specifications of the Rockford 12-Inch Hy-Draulic Slotter. Copy free upon request.

"A Primer of Electronics." Published by the General Electric Company, this four-page illustrated folder provides a simple introduction to the electron and the principles that govern its use. Copy of Folder GED-1068 can be obtained free of charge upon request to the General Electric Electronics Department, Advertising Division, Schenectady, N. Y.

"If It's Piping—Contact Flori" is the title of an interesting 64-page catalog now being issued by The Flori Pipe Company, illustrating and describing various uses for piping and listing present market prices for practically every conceivable kind and size of fabricated piping. Copy of the catalog is available free of charge to executives writing Department C-1, The Flori Pipe Co., St. Louis, Missouri.

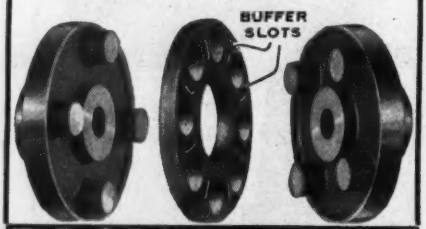
Blackhawk Wrenches. A 24-page catalog on socket, open-end, and box-type wrenches is now being issued by the Blackhawk Mfg. Co., Milwaukee 1, Wis. As an aid to persons buying or using wrenches for the first time, the catalog includes a dictionary of popular wrench terms. Another section illustrates how proper selection of wrenches brings extra speed, safety, and utility to the job. Large illustrations picture each item in its true relative size. Copy of Catalog No. 243 free upon request.



USE CUSHION TORQUE
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The BUFFER-SLOT COUPLING lengthens the life of your Motor-Driven Machines by reducing wear and absorbing the load-shock and vibration that are the sources of most machine failures. It gives you all the advantages of the ordinary coupling and in addition restores to your Direct Drives that protective resiliency you lost when you discarded the Belt Drive. It is a long-lived dependable device especially valuable for use with Ball or Babbitt Bearings.

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DRILL THESE HOLES
BY A QUICK, EASY, INEXPENSIVE METHOD
Your business letterhead will bring literature.
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ANGLES OF SMALL OR LARGE CASTINGS CAN NOW BE CHECKED OR MACHINED WITH *EASE and SPEED*

The turn of a dial (graduated in degrees and minutes) will position castings or parts to any angle desired—for checking measurements, or for boring or other machining operations. The rotating table to which work is fastened can be made to assume any position from vertical to horizontal, and even 30 degrees below in opposite direction.

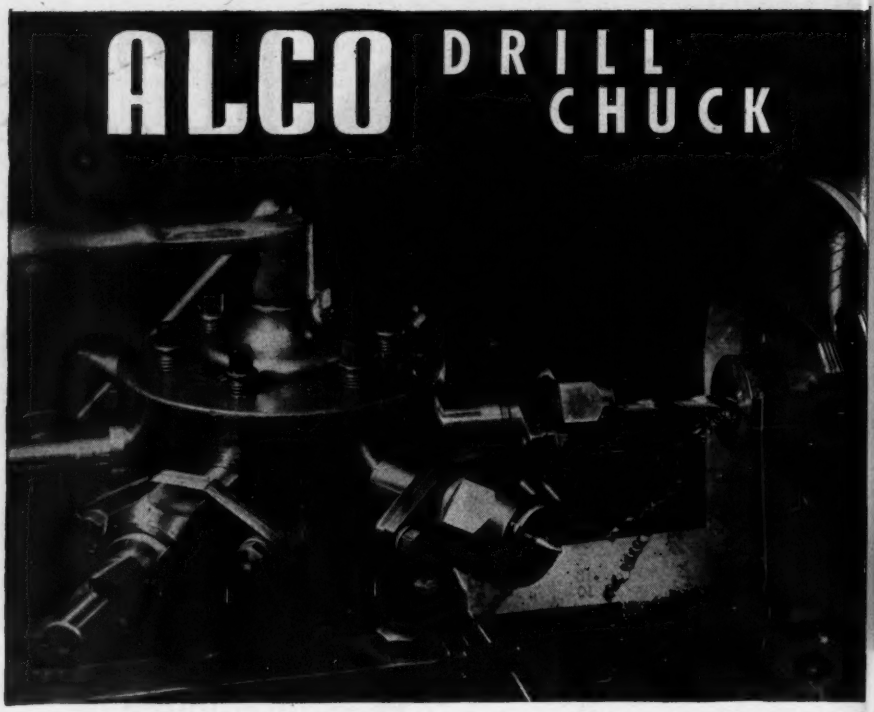
It can be locked or be disengaged to rotate freely by hand. A 10-inch sine bar is provided for closer settings.

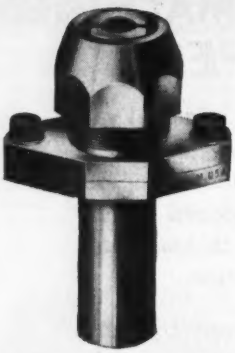
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. . . FOR ALL SCREW MACHINES —OLD OR NEW

Here is a tool which not only holds drills on screw machines, but reamers, counter bores, center drills, boring tools as well *without the use of bushings.*

Besides the highest degree of perfection obtained because of the absolute concentricity of the drilling operation with the work, just think of the time that will not be wasted in making special bushings for special size drills nor looking for any one of 250 different sizes of bushings before the actual setting-up of the machine.

Write now for complete catalog of the ALCO line of tool holders.

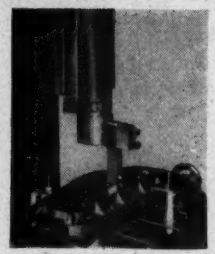
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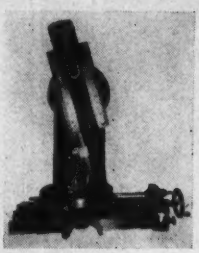
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The Douglas Precision Slotter is adaptable to both tool room and production work. Swiveling ram head with tool holder and rotary table often solves the problem of costly fixtures. Automatic feeds in all directions — 7" to 10" stroke.





Typical production parts machined on a Douglas Slotter.



FOR TOOL ROOM AND PRODUCTION

Prompt Delivery to War Plants



The Rotorex Universal Tool and Cutter Grinder will accurately perform all kinds of tool grinding operations. Readily interchangeable attachments are available to set up machine for single-purpose jobs such as cylindrical, internal and radius grinding.

Operation showing set-up for internal grinding.

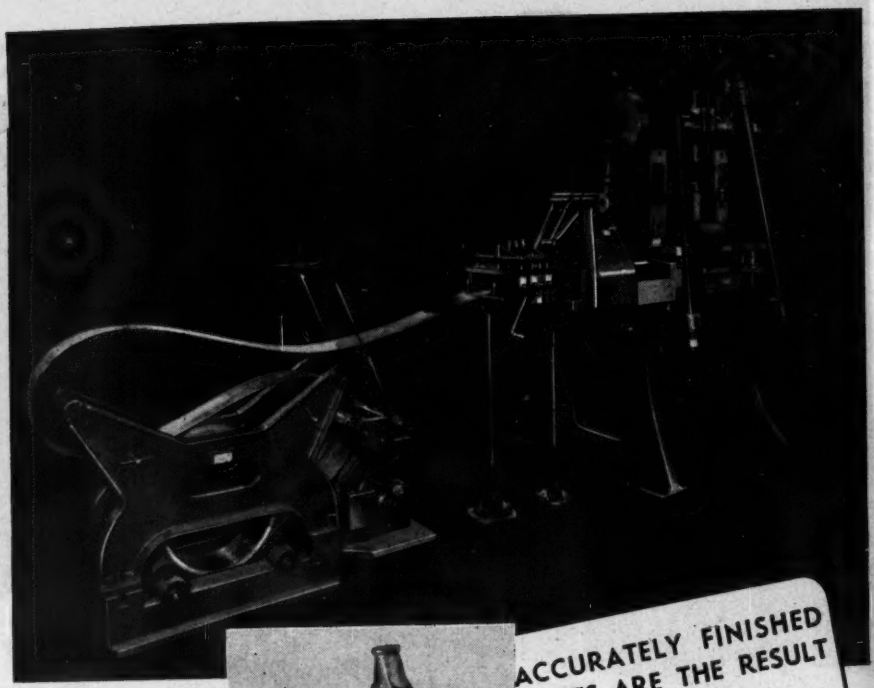




Operation showing set-up for sharpening straight gash hobs.

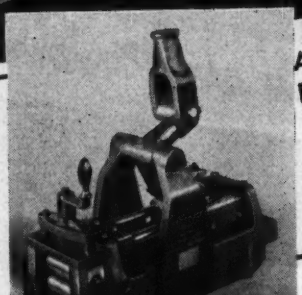
DOUGLAS MACHINERY CO., Inc.

150 BROADWAY • NEW YORK, N. Y.



INQUIRIES

Your inquiries regarding feeding equipment are invited. Catalog No. 50 contains complete descriptions and specifications.



ACCURATELY FINISHED PARTS ARE THE RESULT OF *Accurate Feeding*

Punch Presses are built in a wide variety of sizes and types for the stamping and forming of countless different parts. The final results obtained from your presses are not only dependent upon your dies, but, to a very large extent, dependent upon the accuracy with which the material is fed into the dies.

U.S. SLIDE FEEDS

The U. S. Slide Feeds are designed for the feeding of coil stock. The slide block reciprocates on hardened slide rods (see close-up of feed in lower photo) between definite, adjustable stops insuring controlled accuracy of feed and eliminating defective parts due to over or under feeding. These U. S. Slide Feeds can be used for feeding stock into multiple station dies without the use of pilots and the operation is completely automatic enabling one operator to handle a battery of presses, thus reducing labor costs to a fraction. Set-up and adjustment are simple and quick to make.

U.S. ROLL FEEDS

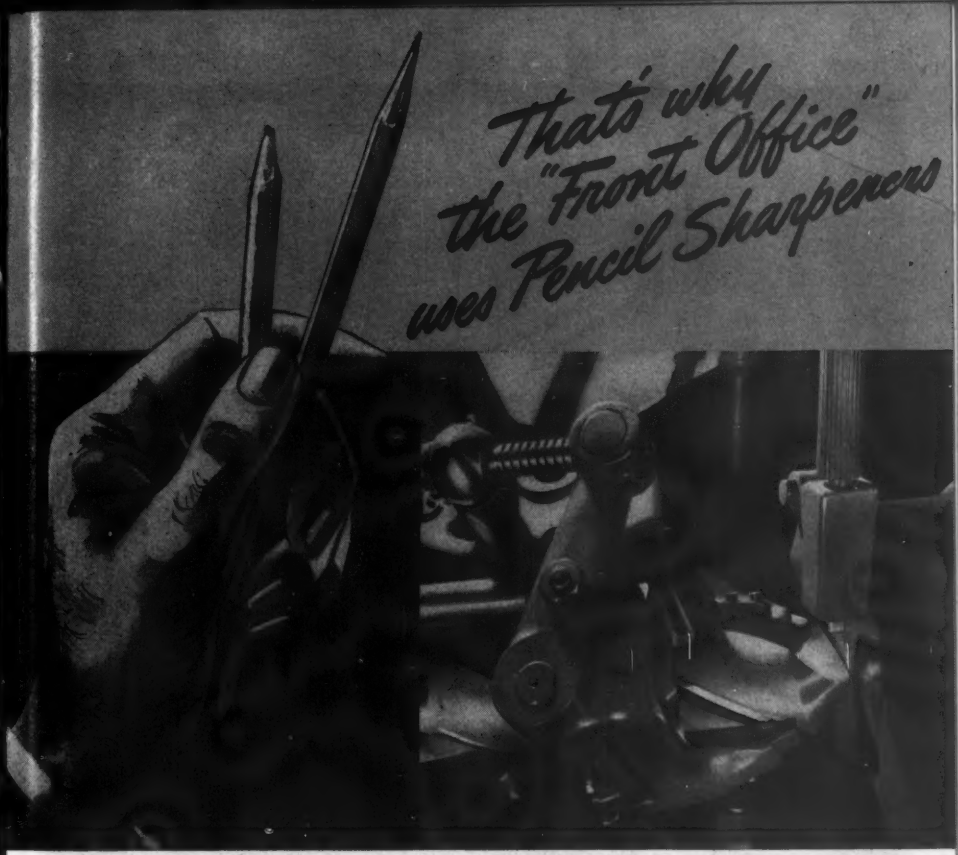
On some jobs, especially where material in short lengths is used, it is desirable to use a Roll Feed. Although no Roll Feed is as accurate as the Slide Feed, it provides a satisfactory method of automatically feeding stock into the press on many jobs. U. S. Roll Feeds are *precision* built units especially designed for many applications where Slide Feeds are not suitable.

ACCESSORY EQUIPMENT

The U. S. Stock Straighteners, Stock Reels, Coil Cradles, and Stock Oilers are designed for use in conjunction with the U. S. Feeds. The upper illustration shows a U. S. Slide Feed, Stock Straightener, and Automatic Coil Cradle being used in combination, making an efficient setup.

THE U. S. TOOL COMPANY, INC., Ampere (East Orange), N. J.

Manufacturers of U. S. Multi Slide Machines and U. S. Multi Millers



t's a quicker, more accurate, less waste-ul way of doing the job. And for those ame good reasons *modern* tool rooms re equipped with

The SELLERS DRILL GRINDER

This method of grinding automatically roduces the scientifically correct drill oint required for precision work. ngles of inclination are equal, contour f lips is identical, resulting in a point hat drills true cylindrical holes faster with more holes per grind.

nexperienced girls are quickly trained o turn out a constant supply of perfect rill points, reducing both your drill nventory and drilling costs.

or proof of why it will pay you to equip your tool room with this modern machine, send us three drills of any size up to 3 ins. and we will return them ground with the Sellers point. No charge, no obligation. Wm. Sellers & Company, 1614 Hamilton St., Philadelphia.



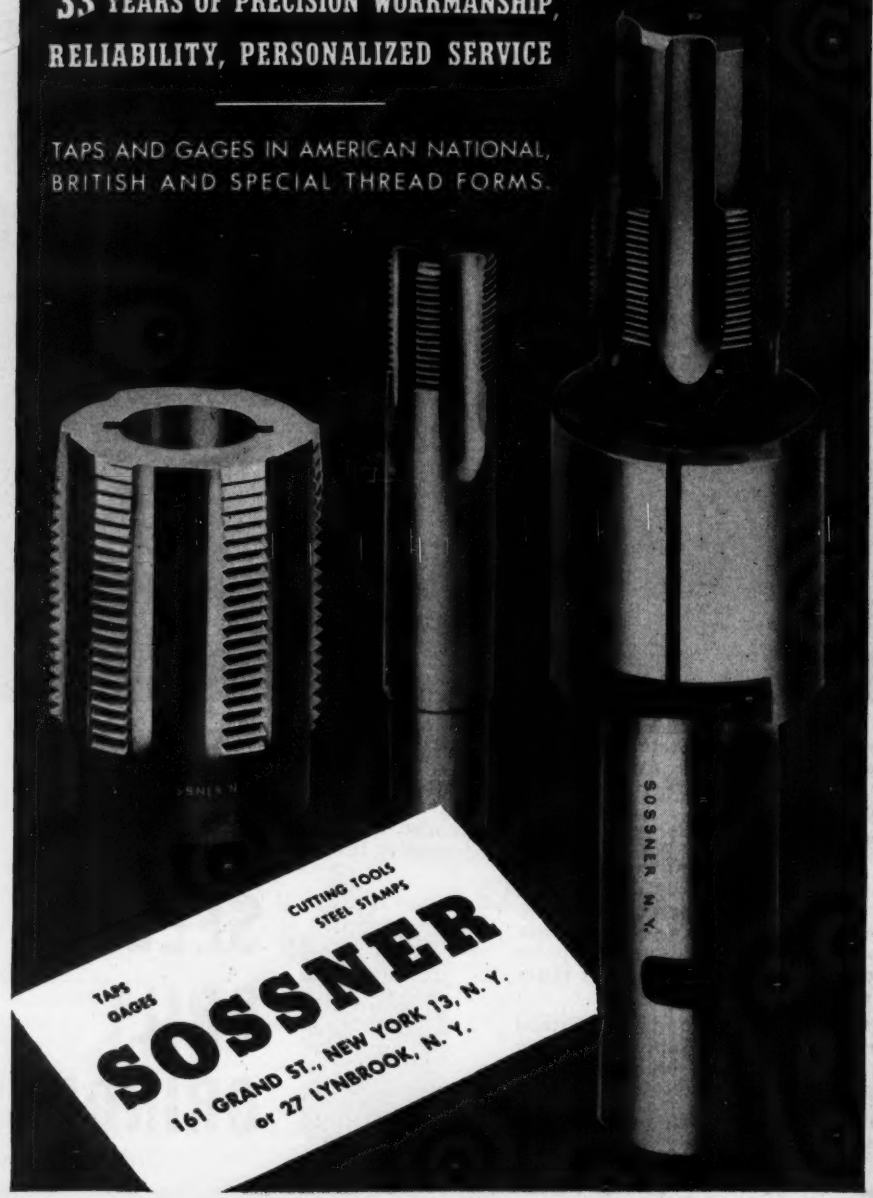
SELLERS DRILL GRINDERS

© 1943, Wm. Sellers & Co.

SELLERS PRECISIONEERING SINCE 1848

33 YEARS OF PRECISION WORKMANSHIP, RELIABILITY, PERSONALIZED SERVICE

TAPS AND GAGES IN AMERICAN NATIONAL, BRITISH AND SPECIAL THREAD FORMS.



GRENBY

Makes a full line of Precision Grinders



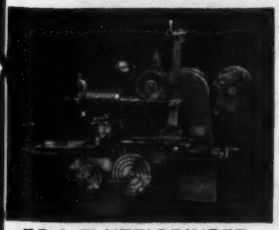
EG-10
EXTERNAL

Power or Hand Feed
8" Between Centers

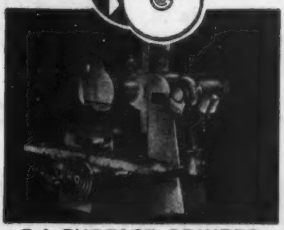


IG-10
INTERNAL

Power or Hand Feed
Grinds 1/8" to 3" Holes



FG-1 FLUTE GRINDER



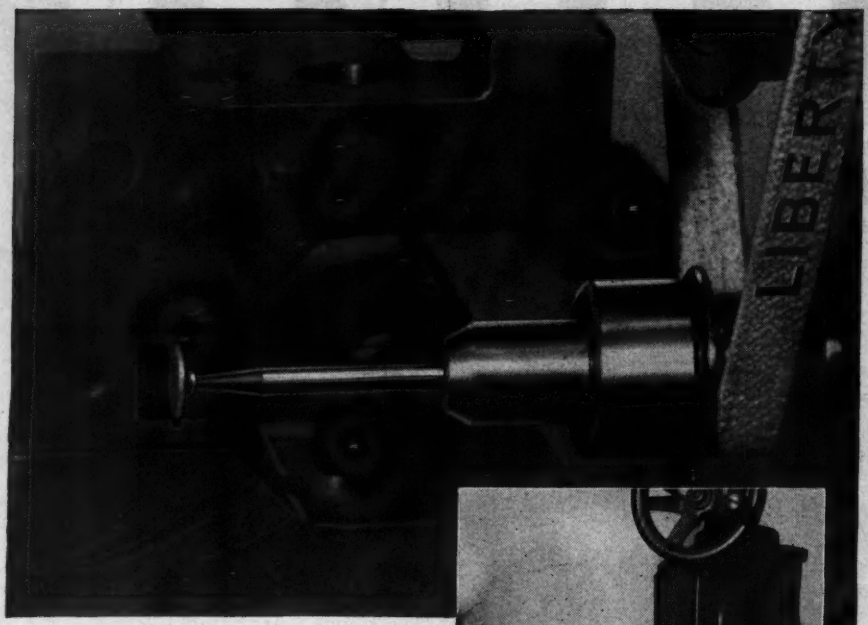
S-1 SURFACE GRINDER

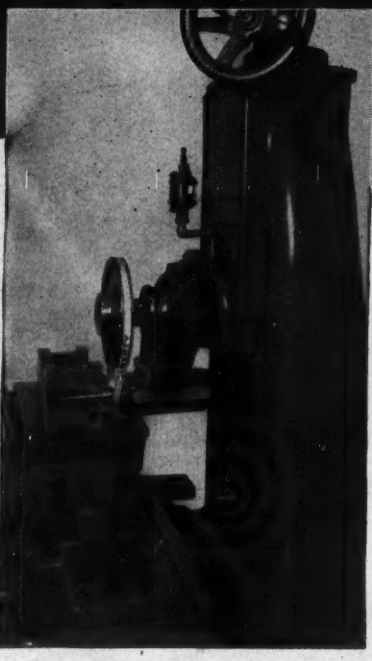


TRS-1 CUTTER GRINDER

HAND FEED ONLY

THE GRENBY MANUFACTURING CO., PLAINVILLE, CONN.





Liberty High Speed Attachments

Grinding a Difficult Keyway

This is Liberty Horizontal attachment No. 90-30 with collet chuck. It can be assembled to your surface grinder in 2 minutes without machining. It will do many intricate jobs which are otherwise impossible without this grinding attachment. The illustration shows the grinding of an inaccessible keyway. Liberty Attachments are available in Horizontal and Vertical models. They are adapted for use on many popular surface grinders. Can be had with solid quill or collet chuck. Hundreds of plants find them indispensable.

Send for Circular

LIBERTY TOOL & GAGE WORKS INC.

237 GEORGIA AVE. **PROVIDENCE 5, R. I.**

Tomorrow's Tools for Today's Tasks

THERE'S A

CLECO SQUEEZER

for Every Job

The illustrations show only typical models; the complete Cleco line includes many others. With required priority, shipment is surprisingly prompt.



No. 41C, with Plunger through 9/16" yoke
Weight.....4⅞ lbs. Length.....9 15/16"
Capacity.....⅛" Dural
1½" Reach 1⅛" Gap ½" Travel



No. 41-L Squeezer with parallel jaw action
Weight.....5½ lbs. Length.....12¼"
Capacity.....⅛" Dural
2½" Reach 1½" Gap 9/16" Travel



No. 81C, with "C" yoke
Weight.....8¼ lbs. Length.....14⅝"
Capacity.....3/16" Dural
2" Reach 1 9/16" Gap ½" Travel



No. 62 One-shot Riveter
Weight.....6⅛ lbs. Length.....10⅞"
Capacity.....⅛" Dural



No. 41 Alligator Squeezer
Weight.....3¼ lbs. Length.....9⅛"
Capacity.....⅛" Dural
1⅜" Reach 1⅝" Gap ⅝" Swing



No. 14A-5 Alligator Squeezer
Weight.....20 lbs. Length.....18¾"
Capacity.....3/16" Dural
5" Reach 2⅛" Gap 1¼" Swing



No. 13B, with "C" yoke
Weight.....9 lbs. Length.....14⅜"
Capacity.....3/16" Dural
2" Reach 1 9/16" Gap 11/16" Travel



No. 83 Blind Riveter
Weight.....4 lbs. Length.....11"
Capacity.....⅛", 5/32" and 9/64" Dural
Nose and block sets available for above sizes and for brazier and counter-sunk heads.

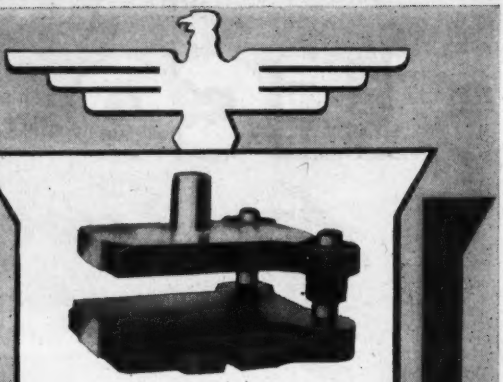
THE CLEVELAND PNEUMATIC TOOL CO.

3781 EAST 77TH STREET, CLEVELAND 5, OHIO • BRANCH OFFICES IN ALL PRINCIPAL CITIES

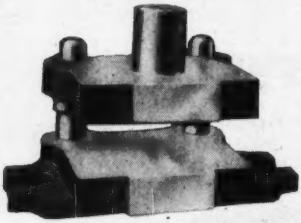
Producto

DIE SETS

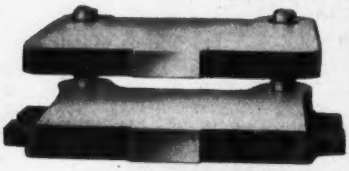
★ For all war plants producing dies for power presses or for any metal stampings or plastic moulds, PRODUCTO is ready to serve you. Hundreds of combinations are available at our factory and assembly plants. Accuracy and interchangeability of all components in Producto Die Sets makes it easy for the tool and die maker. Our 100-page catalog tells the story. Contact our factories below or Die Supply Company, Cleveland, Ohio; Jamison Steel Corporation, San Francisco and Los Angeles.



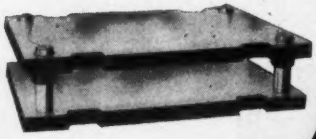
OVERHANG TYPE



REGULAR TYPE



ALL STEEL TYPE



4 PIN DIE SET

OTHER PRODUCTO ACCESSORIES

Dowel Pins — Die Springs — Stripper Bolts — Machine Vises — Socket Screws, etc. Dickerman Automatic Press Feeds.



The PRODUCTO MACHINE COMPANY

990 Housatonic Ave., Bridgeport, Conn.
3017 Madbury Ave., Detroit, Mich.

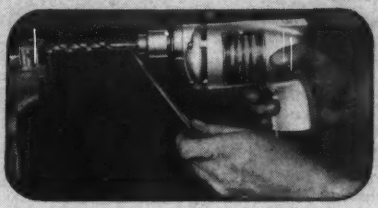
Four Helpful Hints

KEEP UNIVERSAL TOOLS ON THE LINE



Designed for the production line, CP Universal Electric Tools stand up in continuous service with a minimum of maintenance. Aside from periodic inspection, they require little more than occasional tightening and regular lubrication. Here are four hints that help you to keep tools in service. While the drill illustrated is the popular ¼" CP 808, these suggestions apply also to the larger CP Universal Electric Tools.

HOW TO GET MAXIMUM SERVICE FROM CP UNIVERSAL TOOLS



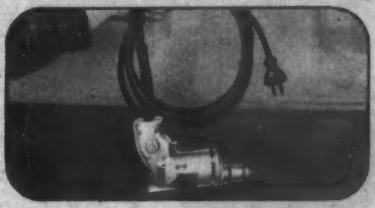
Don't use an oversized drill ground down. This puts a strain on the motor.



To remove chuck, hit key firmly, but not too heavily, with rawhide mallet.



Tighten all screws, particularly cable clamp screw. Loose screws cause wear.



After repairing a tool, loop cable neatly. This saves cable, also tool.

PNEUMATIC TOOLS
ELECTRIC TOOLS
(Hisycle...Universal)
ROCK DRILLS

CHICAGO PNEUMATIC
TOOL CP COMPANY
General Offices: 8 East 44th Street, New York 17, N. Y.

AIR COMPRESSORS
VACUUM PUMPS
DIESEL ENGINES
AVIATION ACCESSORIES

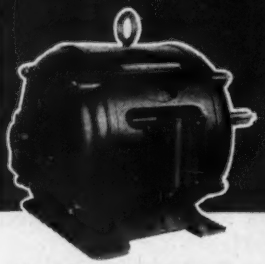


IN TIME OF WAR AND IN TIME OF PEACE...

Wagner

MOTORS

reflect sound engineering
and modern manufacturing methods

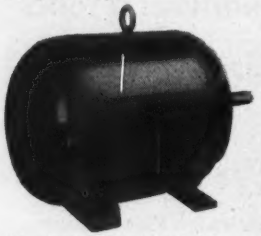


Wagner type RP Squirrel-Cage Motors are used on machine tools and other electrically-driven equipment that operate in clean, dry locations. 1/6 to 400-hp, 25 to 60 cycle, 2-or 3-phase

THE skill and facilities Wagner has gained in 52 years of manufacturing quality motors are now being used to speed up Victory. Wherever there is war activity you will find Wagner motors doing a job—on ships, tanks, and planes...in army cantonments and navy yards . . . on motor driven machinery and equipment in shipyards, in mines and in all kinds of plants producing war materials.

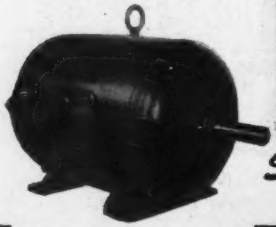
Wagner motors have proved their ability to produce dependable power under the most severe operating conditions and they can help you, too, in your war effort.

No matter what type of motor you require—regardless of the torque, speed, or current requirements, you can choose a motor from the Wagner line that is correctly engineered for the job. The three motors illustrated represent just a few of the various types of Wagner motors. Each Wagner motor has special electrical and mechanical characteristics that make it the ideal motor for certain applications.



Wagner type CP Totally-Enclosed Fan-Cooled Motors are used on machine tools and other motor-driven equipment, where dust, dirt, filings, chips, fumes and other destructive elements are prevalent. 1-1/2 to 125 hp, 25 to 60 cycle, 2- or 3-phase.

Wagner's 29 branches are manned by trained field engineers competent to solve your motor application problems. They will gladly consult with you and do everything possible to assure you the quickest delivery on the motors you need to keep war production on schedule.



Wagner type HP Explosion-Proof Motors are ideal for machines located where inflammable materials and substances are handled or manufactured. 3/4 to 125 hp, 2- or 3-phase, 25 to 60 cycle.

M43-11A

Send for These Valuable Bulletins... Bulletins MU-182 and MU-183 illustrate and describe the complete line of Wagner motors—a motor for every purpose. Copies of these bulletins will be sent upon request.

Wagner Electric Corporation

ESTABLISHED 1891

6448 Plymouth Avenue, St. Louis, Mo., U. S. A.

ELECTRICAL AND AUTOMOTIVE PRODUCTS

BUILT *to keep* PRODUCTION SCHEDULES

On Time!

for the Duration and Afterwards



CLARK drills and grinders

Heavy production schedules for the duration and for post-war manufacturing call for drills and grinders that will give maximum service at minimum upkeep and expense. To meet these requirements, Clark has constructed their drills and grinders so that, by actual tests under continuous service, their record of achievement has proved outstanding. In your future plans, include Clark drills and grinders and assure yourself of long service at low cost operations. If you have a problem concerning the use of drills and grinders, call on Clark. Their engineers will be glad to help you solve it.

"first in the field" CLARK Electric Tools

JAS. CLARK, JR. ELECTRIC CO.

606 BERGMAN ST., LOUISVILLE, KY.



KEEP it coming . . .
by CAREFUL MAINTENANCE

THERE is really no need for us to emphasize the part that chucks play in war production. But there is a need for us . . . and for you . . . to urge every machine tool operator, and especially those who are not "old hands", to take excellent care of chucking equipment these days. A great deal of precious skilled labor and a lot of critical material goes into the manufacture of a Cushman Chuck. As it comes into your shop, it is a fine precision tool with a long potential service life. But it needs periodical lubrication. It should be kept clean and the precision bearing surfaces free from abrasive particles. It must be accurately and carefully mounted on its spindle. And it should not be overloaded. Chucks are tools and tools are weapons . . . treat 'em right.

* * * * *

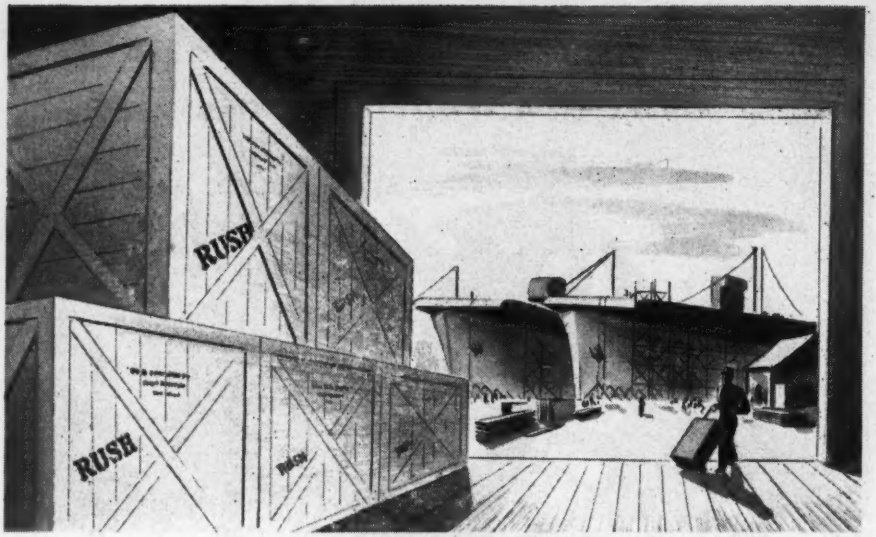
To help you, we can supply convenient CHUCK-CHECK maintenance cards to be given to your operators. Just let us know how many you need. The Cushman Chuck Company, Hartford 1, Conn.

CUSHMAN

A World Standard for PRECISION



FUTURE STARS: Looking ahead, American industry sees countless stars of peacetime production . . . better homes, better equipped; better refrigerators, laundry and kitchen equipment, vacuum cleaners . . . better autos, trucks, tractors, farm and factory machinery . . . made possible, in part, by WESSON Carbide Cutting Tools . . . helping produce new products made from modern metals, tougher, more durable . . . produced faster, at less cost.



marked

RUSH!

Not long ago in an east coast shipyard, two spanking new aircraft carriers chafed at their hawsers — waited for sea duty. But they couldn't sail for they lacked the motors to power ventilators on warm-up decks. They might as well have been ships without rudders, for men can't live in the poisonous fumes spewed from the exhausts of planes preparing for flight.

A hurried check disclosed that unavoidable delays would prevent delivery of the vital motors earlier than 28 weeks. Those carriers couldn't wait that long. A high ranking Navy officer reached for a phone and wires hummed between the yards and our Cincinnati offices.

Not 28 weeks, but 28 days later, the needed motors — MARKED RUSH — were on their way. We at Wesche don't claim that we are the only motor manufacturers who could do a rush job. We are proud, though, that we came through when we were called on.

"Coming through when we're called on" is a habit with us at Wesche. We're not taking any more orders now, priorities or no, but the story of the aircraft carriers, an authentic case history from our files, demonstrates the type of service that will be at your beck and call when the war is won.

The B. A. WESCHE ELECTRIC CO.

1626 Vine Street **Cincinnati, Ohio**





BY UDYLITE

Here is a tank lining that has everything. Koroseal is a synthetic elastic material which is unusually resistant to oxidizing acids and corrosives.

Koroseal is quickly and easily applied directly to wood, steel or other surfaces by means of specially developed adhesives. No vulcanizing. Approximately 100 lbs. per square inch bonding strength.

This material allows practically no absorption of chemical solutions and it does not contaminate plating bath.

Koroseal is unaffected by oils or grease. Resists abrasion well and it is easily and quickly repaired.

● Write for our new detailed bulletin on this *better* tank lining ●

THE UDYLITE CORPORATION

1651 E. Grand Blvd., Detroit, Mich.

Chicago
1943 Walnut Street

Long Island City, N. Y.
11-16, 44th Drive

Cleveland
4408 Carnegie Ave


Precision Built
SMALL REAMERS
for Precision Work
If you are finishing holes to decimal tolerances on aircraft . . . small arms . . . instruments . . . motors . . . engines . . . radio . . . or ANY part that calls for extreme reaming accuracy . . . we are specially equipped to produce the reamers you require . . . built to precise, exacting standards. Our broad experience and complete modern facilities enable us to provide whatever size and type you need . . . and give you remarkably rapid delivery.
SMALL REAMER SPECIALISTS
STRAIGHT
SPIRAL
STEP
PILOT
HAND
1/32" TO 5/8" DIAMETER
SPEEDY DELIVERY
METAL CUTTING TOOLS
AND MANUFACTURING COMPANY
11121 GRAND RIVER AVE. DETROIT 4, MICHIGAN
HOGARTH 9164-5


For Little INSIDE JOBS
BAY STATE
Internal
Grinding Wheels
are made closely to size, with arbor holes parallel to face and accurately centered—take heavy, fast cuts and have long life—are uniform—their porosity is predetermined.
Send for bulletin
BAY STATE
ABRASIVE PRODUCTS CO., WESTBORO, MASS. U.S.A.

UP Goes Production!
DOWN Go Grinding Costs!



No Wonder Production Men Specify This New TRU-THREAD DIAMOND DRESSING TOOL!

THE proof of the performance and economy of this new TRU-THREAD Diamond Dressing Tool is found in the cost and production records of users throughout the country . . . production increases in one plant up to 500% and reductions in per-piece grinding costs as much as 75%.

It's no wonder! Made with a natural fine quality uncut diamond specifically selected for the job, this tool cuts exceptionally clean. It obtains forms faster. Fewer dressings are required. Down time is reduced because more work can be ground between dressings.

The diamond is of a shape that permits angle, radial and multiple form as well as straight dressings. And because this tool can be made and reserviced on a production basis, quick deliveries are assured.

Learn more of the advantages of TRU-THREAD TOOLS. Write or wire for detailed information today.

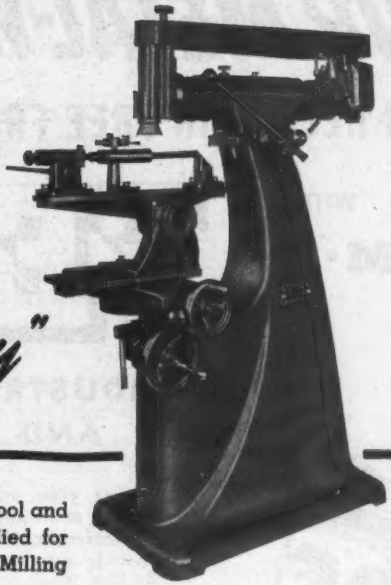
***FOR USE ON*—Excello, Jones & Lamson, Dalzen and all other thread grinding machines.**

WHEEL TRUEING TOOL CO.

3200 W. Davison Avenue — Detroit 6, Mich.

PRECISION TOOL AND CUTTER GRINDING

The "Oliver Way"



The cut illustrates the Oliver Ace Tool and Cutter Grinder as regularly supplied for sharpening the General Run of Milling cutters.

The machine as illustrated is equipped with centers for grinding Hobs, Reamers, Taper Reamers, Staggered tooth cutters, etc. Equipment includes an Adjustable Timken Bearing Head with Taper for Mounting End Mills and similar cutters with shanks.

Note the Simplicity of Setup, the ease with which angles are obtained and the possibilities for Rapid Production of individual cutters or quantities of similar cutters.

Don't Neglect Your Toolroom It's the Backbone of Production!

This is the machine you have heard about; the machine That cutter Manufacturers are using in quantity to Break the Bottle Neck in the production of Milling cutters.

SEND FOR LITERATURE TODAY.

OLIVER INSTRUMENT CO.

1410 E. MAUMEE ST. ADRIAN, MICHIGAN

Oliver OF ADRIAN

AUTOMATIC DRILL GRINDERS — TOOL AND CUTTER GRINDERS — DRILL POINT THINNERS — TEMPLATE TOOL GRINDERS — FACE MILL GRINDERS — DIEMAKING MACHINES

YOUR METAL-WORKERS

CAN KEEP SKIN FREE FROM IRRITATION

WITH

M·S·A FEND

INDUSTRIAL CREAMS AND LOTIONS

Protect your workers against skin irritation, rash and soreness with FEND. Six different FEND Creams and Lotions provide *safe, positive, proved protection* against many-score skin affections. Easy to apply and remove.

Write for descriptive Bulletin FA-79.



MINE SAFETY APPLIANCES COMPANY

Braddock, Thomas and Meade Streets

PITTSBURGH, PENNSYLVANIA

1943

SAW THESE WHEELS REACH "BIG LEAGUE" STATUS

These six MID-WEST "B" BOND grinding wheels — representing part of the MID-WEST carbide tipped tool grinding "team" — were given preliminary "tryouts" in 1942. ¶ During 1943, performing day in and day out in many of America's largest, most productive industrial plants, MID-WEST "B" BOND carbide tool grinding wheels, earned permanent "big league" standing. ¶ Designed and specifically manufactured for grinding any of the numerous types of carbide materials, they have four predominant features:

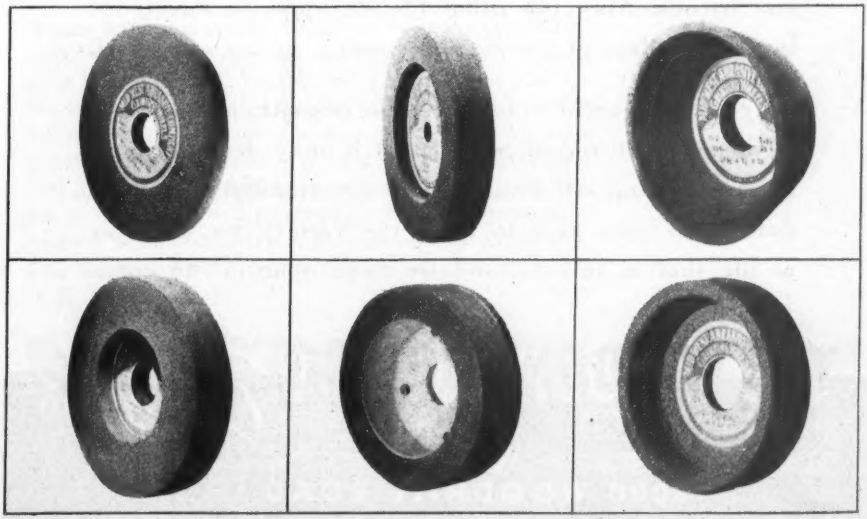
THEY CUT FASTER • THEY CUT SMOOTHER
THEY CUT COOLER • THEY CUT CHEAPER

Just ask the "carbide man" in any plant using "B" BOND wheels!

MID-WEST ABRASIVE COMPANY

Manufacturers of DEPENDABLE Abrasives

1960 E. Milwaukee Avenue Detroit 11, Michigan





Wishing You the Season's Best

In the stress of these stirring war times, we pause to extend our sincere Holiday greetings to our customers and friends. May the usual Holiday joys be sweetened by the privilege of serving our country in her war effort.

May we all continue to have the strength and courage to do our part, regardless of what it may demand of us in sacrifice and self-denial. May we intensify our efforts during the new year to speed the Victory for our way of life that is sure . . . and we hope, soon . . . to come.

THE WELDON TOOL CO. *Cleveland 4, Ohio*

3000 WOODHILL ROAD

On Overalls or Chucks . . .



Threads mean a Lot!

Your Chuck is a sturdy worker . . . built to take it. But those threads of metal *can* be stripped by a new man with bright ideas . . . such as using a pipe extension on the wrench handle, for example. Such treatment means a Chuck out of service—waiting for repairs. To help avoid such delays, to help train novice workers, Westcott has a new Manual in preparation on the care and use of Chucks. It will be ready for distribution shortly and will be announced in an early issue. Westcott Chuck Co., 707 East Walnut Street, Oneida, N.Y.—*since 1872.*

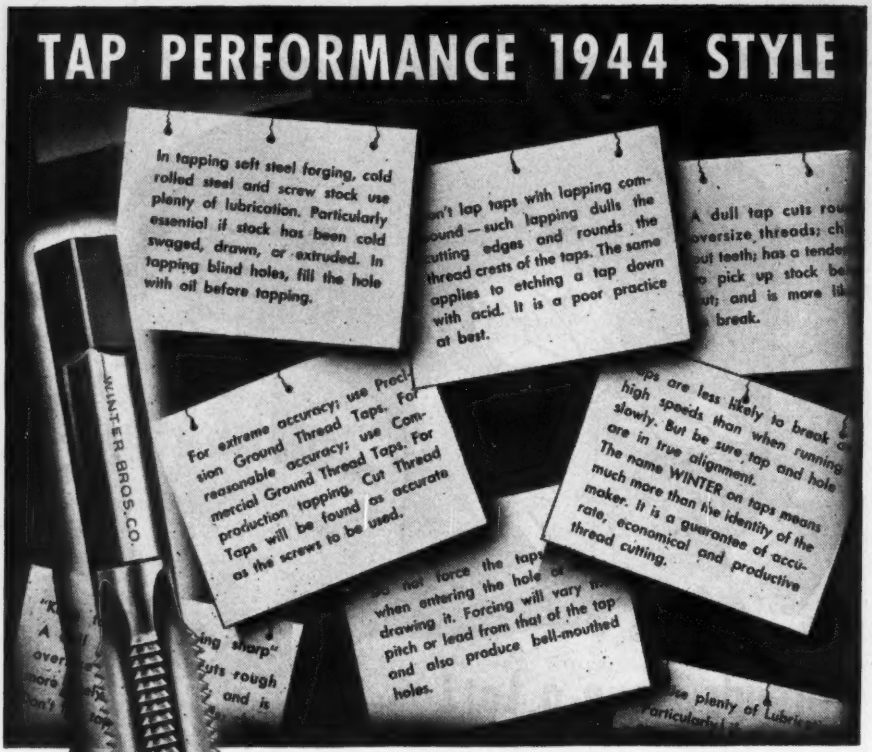
WESTCOTT Chucks

Write for Westcott Catalog No. 550



PRECISION · DEPENDABILITY · SERVICE

TAP PERFORMANCE 1944 STYLE



The size drill used with a tap is very important. If drill is too small the tap must ream out the hole as well as cut a thread. Twice as much power is required to tap a FULL thread as 75% of a full thread. A full thread is rarely required, and the strength of a 75% full thread is well within safe limits. Tap life is also greatly prolonged.

A DIVISION OF NATIONAL TWIST DRILL AND TOOL CO.

Winter Brothers

COMPANY

Wrentham, Massachusetts, U.S.A.

BRANCH STORES SAN FRANCISCO CALIFORNIA · CHICAGO ILLINOIS · DETROIT MICHIGAN

THE DUAL-SPIRAL DOES IT!

The Lempco-Evans Hi-Speed Steel Expansion Reamer has three blade segments, two of which spiral in a direction opposite to that of the third. This opposite-spiral effects a shearing action which finish reams mirror-smooth any machinable metal, ferrous or non-ferrous, as well as laminated-phenol-formaldehyde and other fibrous plastics ordinarily difficult to machine smoothly. The removable blades are quickly, easily, and economically resharpened. .050" to .080" straight line expansion* (in both radial and chordal planes) maintains size and keen cutting edge much longer than ordinary reamers.



ARMY E NAVY

★ *Adjustable for Size Instantaneously on the Job!*

★ *Makes Clean Holes.*

★ *Eliminates Costly Wear on Plug Gauges caused by Abrasive Left in Honed Holes.*

★ *Extension Pilots for Alignment Jobs.*

★ *Reams Smoothly over Keyways and Split Bushings.*

***(Sizes under 11/16" slightly less)**

WRITE FOR CATALOG

LEMPCO

5717 DUNHAM RD. • BEDFORD, OHIO

Immediate Shipment
STEEL BOXES
FOR YOUR PRODUCTION NEEDS



STYLE 300 STACKING BOX

Just right for your small parts. Light in weight, easy to handle. Equipped with drop handles each end. Runners save wear on bottom of box and act as positive stacking lock.

No. 301—6"x 9" x3½"—20 ga., $.55 Each
No. 302—8"x12" x4" —20 ga., $.60 Each
No. 303—9"x13½"x4½"—19 ga., $.75 Each



STYLE 700 STACKING BOX

A light weight box designed for quick identification of contents. Will stack with No. 303. Finished olive green enamel, baked on.

No. 703—9"x13½"x4½"—19 ga., $.95 Each



STYLE 200 STRAIGHT SIDE SHOP BOX

A straight side shop box with drop handles each end. Excellent for shop use where stacking feature is not required.

No. 201—6"x 9" x3½"—20 ga., $.40 Each
No. 202—8"x12" x4" —20 ga., $.45 Each
No. 203—9"x13½"x4½"—19 ga., $.60 Each

Prices F.O.B. Factory, Philadelphia—Any Quantity! Order Today—Write, Wire or Phone.

AMERICAN METAL WORKS, INC.

1501 GERMANTOWN AVENUE **PHILADELPHIA 22, PA.**

INCREASE YOUR MAN - POWER BY BETTER SELECTION OF . . .

MACHINE - POWER



American industry has about reached the "bottom of the barrel" for man-power. Any required increase in production, therefore, must come from improved efficiency of present workers and their machines.

Alert manufacturing executives have substantially increased production with marked savings in power, capital investment and operating cost—by using fast, streamlined Walker-Turner Machine Tools on hundreds of jobs where heavier and slower equipment had been employed formerly. A few of these "speeder-uppers" are shown on this page. Send for Catalog.

WALKER - TURNER COMPANY, INC.
7123 Berckman Street, Plainfield, N. J.

walker-turner
COMPANY, INC.
PLAINFIELD, N.J.
U.S.A.

MACHINE TOOLS

DRILL PRESSES — HAND AND POWER FEED • RADIAL DRILLS
METAL CUTTING BAND SAWS • POLISHING LATHES • FLEXIBLE SHAFT MACHINES
RADIAL CUT-OFF MACHINES FOR METAL • MOTORS • BELT & DISC SURFACERS



War plants are obtaining more production per man-hour with Niagara Power Squaring Shears because of accurate cutting, quick setting, ball bearing, self-measuring parallel back gages, full visibility of cutting line, instant acting Niagara sleeve clutch and other modern features.

Enclosed drive with gears, clutch and eccentrics running in oil assure long life and low maintenance cost. Four-edge, solid tool steel knives are standard equipment. Niagara Machine & Tool Works, Buffalo, N. Y. District Offices: Detroit, Cleveland, New York.

Shear knives available for cutting alloy and special steels. Let us know what you desire to cut. Prompt delivery on spare knives for Niagara Squaring Shears. Also factory regrinding service by the same skilled men who grind new Niagara knives.

BUY UNITED STATES WAR BONDS AND STAMPS

Plan your Post-War *Costs*, too!

Of course, you are planning your post-war products. Thinking about post-war re-employment, too. But, how about production *costs*? Unless your plan embodies ways to keep costs in line, neither your products nor your re-employment will get very far.

Let Lipe Carbo-Matic Lathes help you. Designed and engineered for fast, high-precision production, at a time when costs were still the controlling factor, Lipe Carbo-Matics will lower your unit costs, lower your tool costs, lower your spoilage costs and lower your labor costs. Investigate now. Ask for production performance and cost records.

Lipe Carbo-Matics are fully automatic. Hydraulic holding equipment, feeds, tailstock quill. Swing over bed 15", over carriage 8", between centers 30".

LIPE-Rollway Corporation
Syracuse, N. Y.



LIPE *Carbo-Matic* LATHE

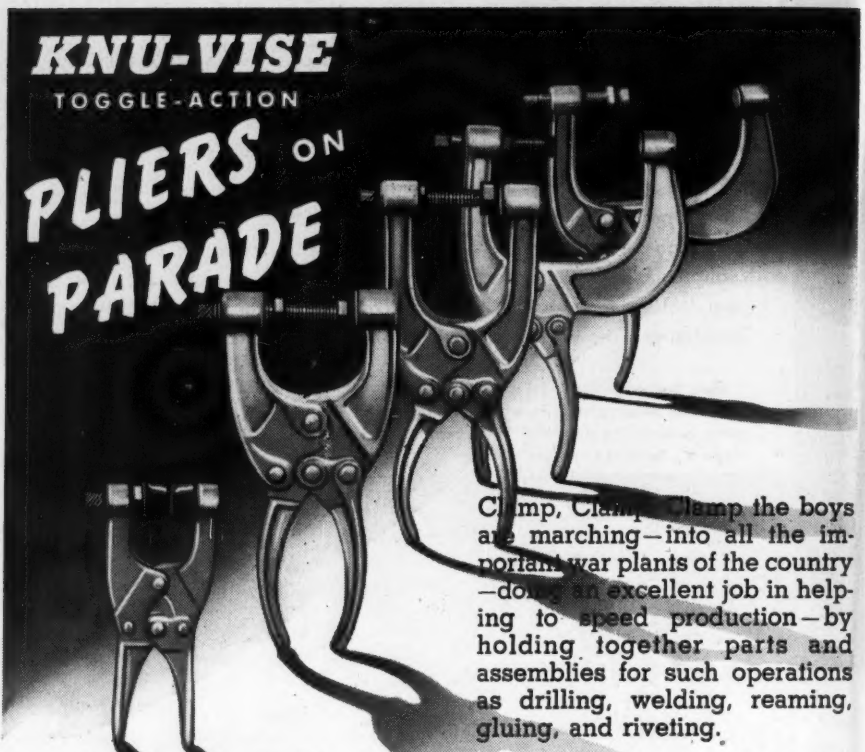
BUY UNITED STATES WAR BONDS AND STAMPS

1943

KNU-VISE

TOGGLE-ACTION

PLIERS ON PARADE



Clamp, Clamp, Clamp the boys are marching—into all the important war plants of the country—doing an excellent job in helping to speed production—by holding together parts and assemblies for such operations as drilling, welding, reaming, gluing, and riveting.

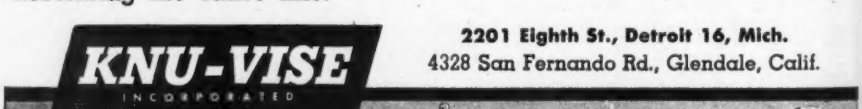
From the finer pliers leading the parade to the huge ones in the rear, every pair is doing real service in war activity.

The small ones in front (4¾" long) hold airplane wings for multiple drilling operations. The next two models hold parts during welding, and the next two—with their deep throats—serve to hold angle irons and channel sections and other odd shapes in other war plants.

Whatever your clamping problem, Knu-Vise has a clamp that will meet your particular need and increase your production. Send for our catalog describing the entire line.

KNU-VISE
INCORPORATED

2201 Eighth St., Detroit 16, Mich.
4328 San Fernando Rd., Glendale, Calif.





1944 PRODUCTION FORMULA:

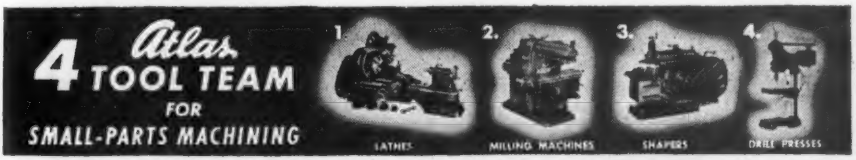
"MATCH THE MACHINE TO THE JOB"

The hopes of the free world are in the machine shops of America. To speed Victory, America's production goal of ships, tanks, planes and guns must be met!

One sure way to reach that goal is to use machine tools to the limit of their capacities to make the most of every production hour. It means "match the machine to the job": massive machines where size and power are really needed — *modern, fast precision tools to take over small-parts production so that capacities of larger machines will not be wasted.*

Outstanding examples of compact modern machine tools are those in the Atlas 4 Tool Team for Small-Part Machining — Lathes, Milling Machines, Shapers, Drill Presses. Ask your Atlas supplier to give you the facts about their production capabilities or write us. Atlas Press Co., 1246N. Pitcher Street, Kalamazoo, Michigan.





You can bank on

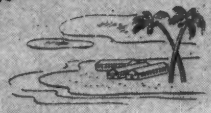
EGYPTIAN FINISHES

for

Steel Fabricated Buildings

for

Any Task-Force Structure



ANYWHERE





OFFICIAL U. S. NAVY PHOTO

Picture of a hospital going somewhere.



OFFICIAL U. S. NAVY PHOTO

Above . . . Here it is, set up and operating . . . where it's needed.

•

An entire hospital unit of steel fabricated buildings . . . overseas.



OFFICIAL U. S. NAVY PHOTO

Are you making steel fabricated task force building assemblies? If so, let us help you with your painting problems. We know your specification requirements.

Egyptian Finishes are giving complete satisfaction on hundreds of such buildings now in service on all the far flung fighting fronts of the world.

Egyptian Finish, for steel fabricated task force buildings, can be applied by dip, spray or roller coating method. It dries quickly for handling and packing with a minimum of special equipment.

This is but one of the many finishing problems with which we can help you. Today, Egyptian service to you is definitely two way: 1— it covers the war products you are now making; 2 — it covers the peace products you'll be making in the post war period to come.

★ ★ ★

Special correspondence on finishing problems is invited.

Egyptian's new U. S. Government "Spec" Book—4th Edition—is ready. It's helpful and it's FREE. Send for your copy. Please address Dept. F-12.

THE EGYPTIAN LACQUER MANUFACTURING COMPANY

ROCKEFELLER CENTER, NEW YORK 20, N. Y.

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EGYPTIAN

SUPERIOR FINISHES

GEROTOR

LIQUID PUMPS

LOGAN HYDRAULIC PRESS... another example of Gerotor's service to the industrial field. Behind Gerotor is a council of skilled engineers available to help you solve war production problems—or to assist you in post war planning.

May we serve you, too?

GEROTOR DIVISION
May Oil Burner Corporation
Baltimore-1, Maryland





DUSTKOPS

STOP DUST

from ALL Abrasive Operations

Entirely Self-contained. Motor, fan, cyclone separator and filter. Fast installation. Flexible metal hose permits installation complete in minutes.

Compact and Portable. Even the biggest DUSTKOPS will usually fit in the existing space behind or beside the grinder.

Send now for complete information. To save time, describe the source of the dust when you write.

AGET-DETROIT CO.

604 First National Bldg., Ann Arbor, Mich.
Detroit Office: CAdillac 3090—Zone 26



MODEL 950
has a cyclone separator.

"READY TO GO" this model is for medium duty work of all kinds.



MODEL 600
has a spun glass filter.

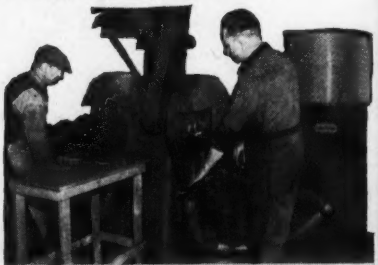
Ideal for light duty production surface grinding.

MODEL 600
Spun Glass Filter

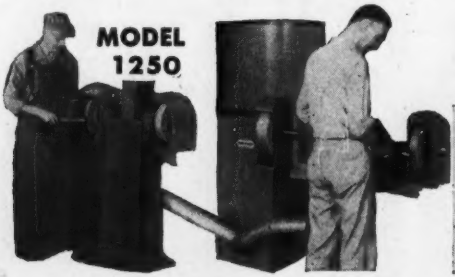


For smallest grinders, laboratory work.

MODEL 1250
has a cyclone separator.



Handles all the dust from this armor grinding job easily.



MODEL 1250

Four wheels exhaust into a single Model 1250 that gets all the dust.

A DOWNRIGHT PRACTICAL WAR TOOL

"Buffalo" "15" DRILL has what it takes to deliver faster, easier, more accurately



Photo courtesy Bell Aircraft Corp.

No fancy gadgets, no mechanical ginger-bread or bright-colored trim—that's because the Buffalo "15" Drill is *not* designed for show, but for husky performance on the production line where the going's tough. Offered in a wide range of models—bench and pedestal types—to meet varying shop requirements. The Buffalo "15" Drill is simple in design, exceptionally study in construction, easy to operate and safe and accurate even in inexpert hands. Specifications on request.

Write for Bulletin 3123-A.

BUFFALO FORGE COMPANY
388 BROADWAY BUFFALO, N. Y.
Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

"Buffalo" DRILLING MACHINES

Tool sharpening is *simpler, easier, cheaper,* and *extremely accurate* .. with the new

Delta Tool and Cutter Grinder



Here is the latest development in Tool & Cutter Grinder design, combining the best features of units of this kind — and its low cost permits its use in all types of shops where accurate grinding must be done.

Almost any conceivable angle can be ground. Delta construction features assure perfect alignment and freedom from play, for extreme accuracy over a long, useful life. Without the new Tool & Cutter Grinder attachment, machine may also be used as a surface grinder.

For a real find that gives creditable results, investigate this goodlooking, efficient machine. Consult your Delta industrial distributor (Delta sells only through distributors) or write for new bulletin. M-6C

Specifications

Wheels must have 1¼" hole.

Table surface 5¾ x 13".

Traverse feed, one graduation is .001".

Maximum vertical adjustment of wheel by means of micrometer is ⅜", each graduation is .0005".

Spindle speeds with a 60 cy 1750 R.P.M. motor are 3200 and 4200 R.P.M.

Price f.o.b. Milwaukee without wheels, motor, or switch.. $370.00

Priority required, A-1-A or better, under Restrictions of Limitations Order L-237.

Tear out and mail coupon today!

THE DELTA MFG. CO.
602N East Vienna Avenue,
Milwaukee 1, Wisconsin
Please send me your new catalog giving full details on the new Delta Tool & Cutter Grinder and your full line of low-cost machine tools.

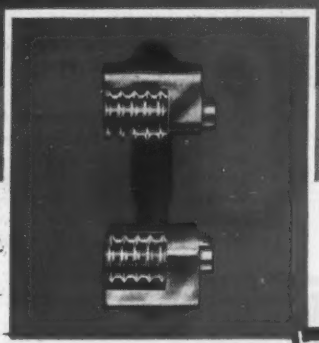
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Company.....
Address.....
City.....(...) State.....

DELTA
MILWAUKEE
Machine Tools



VARD John-Sons

Roll Thread Snap Gages



We are in quantity production on Vard roll thread snap gages with John-Sons concentric rolls.

Now, these well-known gage rolls, which can inspect either right or left hand threads, are mounted in the improved Vard frame with its hand fitting grip, wide machine pads for bench mounting and adjustable tolerance pins.

This gage is offered in 3 styles in National, Acme, Whitworth and Metric thread forms. Gages run in sizes from number series up to and including 12 inches and in 5/16" to 13/16" roll lengths. Write for literature.

ARMY E NAVY

VARD INC.

PASADENA, CALIFORNIA



THE USEFUL, ACCURATE LIFE of Standard Gage Block Sets *Increased Many Times Over*

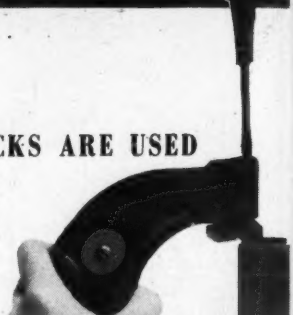


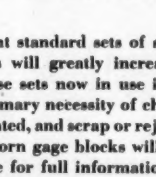
WHEN *Carblox*

CEMENTED-CARBIDE GAGE BLOCKS ARE USED AS END BLOCKS IN BUILD-UPS

The greatest wear factor in the use of any gage blocks is caused by abrasion on the ends of the build-up. Carblox used on each end of a build-up will act as protective anvils and prevent wear on the less wear-resistant steel blocks.

Carblox, used to supplement standard sets of steel or chrome plated gage blocks will greatly increase the usable, accurate life of those sets now in use in your plant. In addition, the customary necessity of checking blocks can be largely eliminated, and scrap or rejections resulting from the use of worn gage blocks will be reduced to a minimum. Write for full information.





LINCOLN PARK TOOL and GAGE CO.

LINCOLN PARK, MICHIGAN

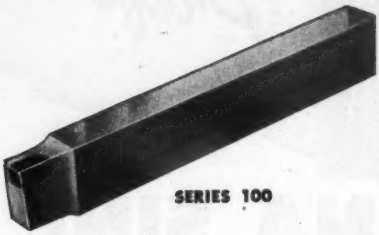
PROMPT DELIVERY

Tungsten Carbide Tipped Tools

Price $1.00 Each In Any Size

New Low Prices—Increase Production—Cut Operating Costs

Tools are tipped with Tungsten Carbide, and are suitable for machining cast-iron, brass, bronze, aluminum, non-ferrous materials (such as hard rubber, bakelite, fibre), and tough alloy steels up to 500 Brinell hardness.

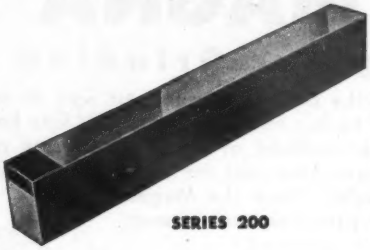


SERIES 100

Left—100 Series

Left Hand-Reverse Image, Right Hand Shown

Tool No. RH	LH	Shank Size
R-100	L-100	¼ x ¼ x 2
R-101	L-102	5/16 x 5/16 x 2¼
R-103	L-104	⅜ x ⅜ x 2½
R-105	L-106	7/16 x 7/16 x 3
R-107	L-108	½ x ½ x 3½



SERIES 200

200 Series

Tool No.	Shank Size
200	¼ x ¼ x 2
201	5/16 x 5/16 x 2¼
202	⅜ x ⅜ x 2½
203	7/16 x 7/16 x 3
204	½ x ½ x 3½

Below—

300 Series

Tool No.	Shank Size
300	¼ x ¼ x 2
301	5/16 x 5/16 x 2½
302	⅜ x ⅜ x 2½
303	½ x ½ x 3½

STANDARD TUNGSTEN CARBIDE TIPPED TOOL BITS

In lots of 12 assorted in any Series; 100-200-300 Series an extra 10% will be allowed; also in lot of 50 assorted 20% discount will be allowed.



SERIES 300

Sizes not listed as well as special TIPPED TOOLS will be quoted upon request. When ordering, state tool number and quantity desired.

We Carry Silicon Carbide Emery Wheels for Grinding Tungsten Carbide Tool Bits.

VICTOR MACHINERY EXCHANGE, INC.

251 CENTER STREET Phone: CAnal 6-5575 NEW YORK, N. Y.



Machine Operators Prefer

The MAGNA SINE

For Angular Grinding Set-ups

Ask any man in the shop about the best way to set up an angular grinding job. If he has ever used a Magna Sine he will tell you that there is no other method of securing accurate angular set-ups so quickly. The Magna Sine uses the sine bar and gage block method of determining angles. Since the Magna Sine itself is a precision tool a most accurate set-up is obtained.

The work is held securely at the turn of a switch. There are no clamps or screws to slip or distort the part. The time required for even the most complicated compound angle set-up is reduced to a matter of minutes.

The Magna Sine is supplied in two sizes in both single and compound angle models. A non-magnetic sine plate for inspection purposes is also available at somewhat lower cost. Write today for complete information.

This quotation is from a letter received by Robbins Engineering Company from a toolmaker.

"I work in the toolroom at our plant and there is hardly a day that goes by that I do not use your Magna Sine."

ROBBINS ENGINEERING COMPANY

318 MIDLAND AVENUE • DETROIT, MICHIGAN

LONG LENGTH

HIGH SPEED DRILLS

9" Cutting Flute

12" Long



Prompt Delivery

Size Inches	Length Overall Inches	Length of Flute Inches	Our Price Net Each High Speed
1/8	12	9	$3.00
9/64	12	9	3.00
5/32	12	9	3.00
11/64	12	9	3.00
3/16	12	9	3.00
13/64	12	9	3.25
7/32	12	9	3.25
15/64	12	9	3.25
1/4	12	9	3.50
17/64	12	9	3.50
9/32	12	9	3.50
19/64	12	9	3.50
5/16	12	9	3.75
21/64	12	9	3.75
11/32	12	9	3.75
23/64	12	9	3.75
3/8	12	9	4.00
25/64	12	9	4.00
13/32	12	9	4.25
27/64	12	9	4.25
7/16	12	9	4.50
29/64	12	9	4.75
15/32	12	9	4.75
31/64	12	9	5.00
1/2	12	9	5.00

VICTOR MACHINERY EXCHANGE, INC.

251 CENTER STREET Phone: CAnal 6-5575 NEW YORK, N. Y.

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MACHINE WORK • CASTINGS • HEAT-TREATING
FORGINGS • EMPLOYMENT • BUSINESS • ETC.

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Wood and Metal — also Match Plates.
For all kinds of castings—large or small.
Estimates on Request.

GENERAL PATTERN WORKS
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Phone MAin 4751 Cincinnati, Ohio

AUTOMATIC AND HAND SCREW MACHINE PRODUCTS

. . . up to 2" diameter — any material — *small or large quantities.* Prompt service.

IMSANDE SCREW PRODUCTS CO.
3517 Cardiff Ave., Oakley, Cincinnati, Ohio

CENTERLESS GRINDING

SINCE 1905

CINCINNATI
ICE PICK & TONG MFG. CO.

118 BURROWS ST. • CINCINNATI, O.

GRIND THE
Eastern Centerless Way

Our new plant with increased facilities assures

PROMPT SERVICE

Eastern Centerless Grinding Co.
Incorporated
470 Tolland St. East Hartford, Conn.

PRECISION GROUND

GEARS CAMS
THREADS SPLINES

Excellent facilities for grinding gears, cams, threads and splines on a contract basis.

SEND BLUEPRINTS FOR ESTIMATE

HARTFORD SPECIAL MACHINERY COMPANY
Hartford, Conn.

CENTERLESS GRINDING

Straight, Cylindrical, Shoulder, Profile, and Multiple Diameters . . . Ground Taper Pins Screw Machine Products. Heat treated and ground if necessary. Improved and expanded facilities insure prompt and accurate service.
Send blueprints or samples for estimates.

PORTER MACHINE CO.
3139 Enyart Ave., Oakley, Cincinnati, Ohio

A COMPLETE
PRECISION GRINDING
SERVICE

CENTERLESS GRINDING
INTERNAL CYLINDRICAL GRINDING
EXTERNAL CYLINDRICAL GRINDING
BLANCHARD SURFACE GRINDING
PLAIN SURFACE GRINDING
THREAD GRINDING



Send Blueprint Sketch or Samples for Quotation

ACE
ACE MANUFACTURING CORP.
1235 E. Erie Avenue
Philadelphia, Pa.

Hand Screw Machine Products
UP TO 3" BAR OR CHUCK.
PRODUCTION MILLING ON DUPLICATE MACHINE PARTS.
GAUGES, JIGS, FIXTURES AND SPECIAL MACHINES.
BEAVER MACHINE & TOOL CO.
1137 W. Belden Ave. Syracuse 4, N. Y.

BAKELITE SILENT GEAR SERVICE
ALL SIZE BLANKS IN STOCK.
Teeth Cut To Your Specifications.
Prompt Delivery. *Write for quotation.*
GREAVES MACHINE TOOL COMPANY
2009 Eastern Avenue Cincinnati, Ohio

Prompt Service Guaranteed
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SURFACE GRINDING
24" x 72" Capacity.
Small and Large Work.
Send prints and specifications for estimates.
ACME TOOL CO.
200 CHURCH ST. NEW YORK 13, N. Y.

Northern New Jersey Representation
Experienced engineering sales office solicits on commission and exclusive basis one or two accounts machine shop or metal working equipment. Can also handle line to dealers mill supplies. Active selling and financial responsibility. Confidential correspondence principals only. Address Box 128, Modern Machine Shop, 431 Main Street, Cincinnati 2, Ohio.

WANTED
Additional lines of tools, gages, or allied shop equipment that can be sold to metal manufacturing plants in the Chicago Territory. Only the products of progressive and reputable manufacturers will be considered on an exclusive agency basis. Our firm of Manufacturers Agents has been established for over 20 years and we can offer you complete sales and engineering service on your line. Our contacts and connections assure of a satisfactory volume of business.
Write Box 124, Modern Machine Shop, 431 Main Street, Cincinnati 2, Ohio

WANTED
Libert High Speed Shear, No. 1036 or No. 1060. Give description and price.
RICHARDSON
Cawker City • Kansas

Westinghouse Air Conditioning and Industrial Refrigeration. Controlled temperature, humidity and air cleanliness mean uniform quality, precision, fewer rejections, and faster production according to a booklet on air conditioning and industrial refrigeration announced by Westinghouse Electric and Manufacturing Company. In machining work, optical goods grinding and assembly, flying suit storage, instrument assembly, spot welding, X-ray film developing, airfield traffic control, and other industrial processes, the booklet shows how air conditioning and industrial refrigeration solves production problems.

This 20-page booklet illustrates and describes the Westinghouse Hermetically-sealed Compressor and traces its development from the 1932 models up to the present design. It also includes explanations and diagrams concerning the principles of air conditioning and illustrates the complete line of Westinghouse equipment for air conditioning and industrial refrigeration, including models from 1 to 100 horsepower.

A copy of Booklet 3AC-0201 may be obtained from Westinghouse Electric & Mfg. Co., East Springfield, Mass.

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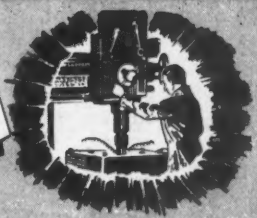
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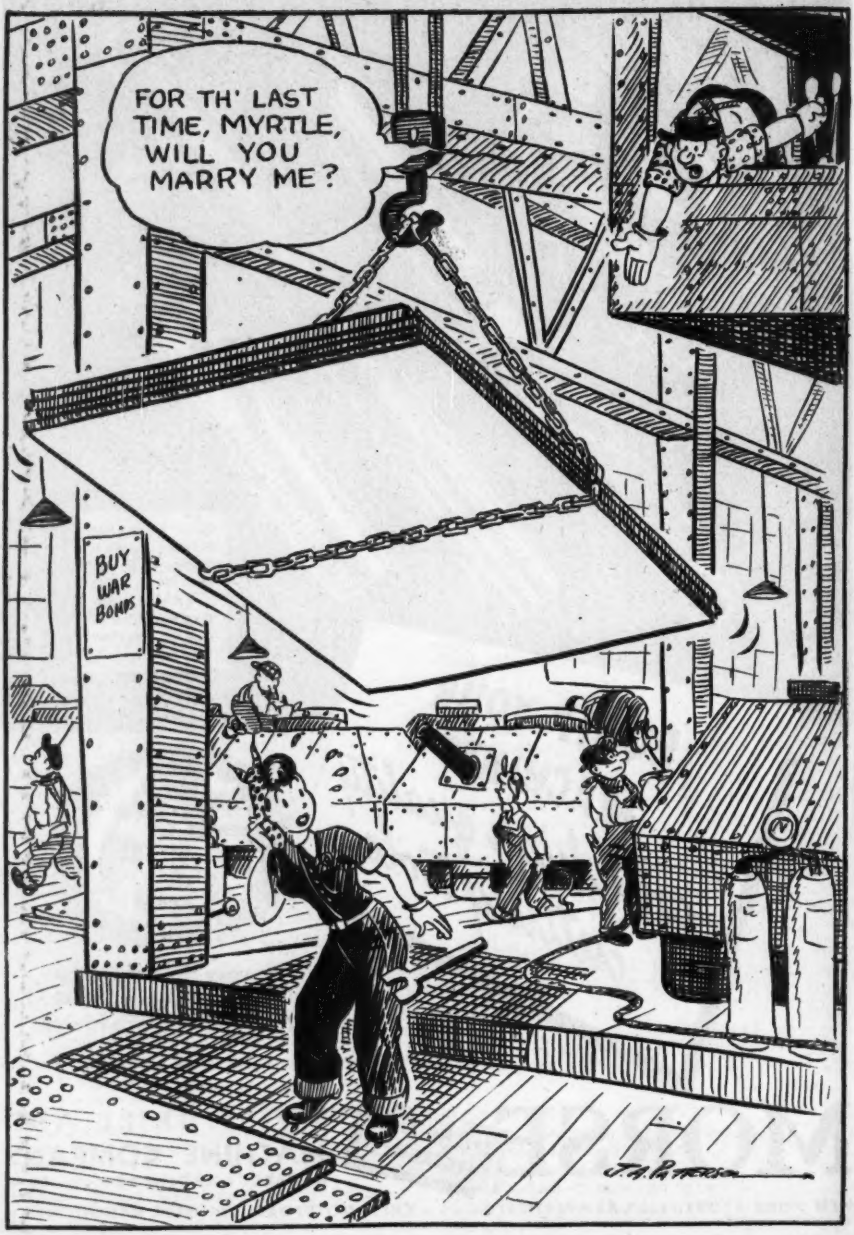
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The Last Word . . .

THE end of the war is not in sight—indeed, the heaviest fighting is yet to come—but inasmuch as the Government is acknowledging by its failure to renew many contracts that we have an ample supply of many classes of war materials, the problem of conversion to normal peace-time activities is already facing us. And this is going to be no small problem. As a matter of fact, it will probably be much more difficult for industry to get out of war work than it was to get into it.

The situation was summed up very capably by D. E. Browne, comptroller of the Lockheed Aircraft Corporation, recently in an address before the Los Angeles chapter of the National Association of Cost Accountants. Among other things Mr. Browne said "Many individuals feel that now is not the time to discuss contract terminations. We are still engaged in a war which they feel is a long way from being finished. In this judgment of the prospects of an early termination of hostilities, I agree, but I am in complete disagreement with the view that now is not the proper time to discuss terminations.

"The War Department has already terminated more in dollar amount of contracts than were terminated at the conclusion of World War I. The experience is at hand; let us profit by that experience. Let us not continue the pattern which forced Kenneth Rockey, chairman of the Navy Price Adjustment Board, to observe that in effect the Government had made it easy for a contractor to get into war production, but had provided no means for getting out."

Mr. Browne emphasized that industry must be reduced from its fear of governmental restrictions if there is to be any widespread employment after this war. Drawing a sharp line between government procurement and free enterprise, Mr. Browne suggested the addition of "freedom of enterprise" to the Four Freedoms of the Atlantic Charter. Said he "It has been pointed out that an inmate of San Quentin can enjoy all of the Four Freedoms—freedom from want, from fear, of speech, and of worship. What he lacks is freedom of action — the freedom of enterprise."

Quoting statistics proving that the United States, with 7 per cent of the world's population, owns 80 per cent of the world's automobiles, 50 per cent of its telephones, and 60 per cent of its life insurance policies, Mr. Browne declared that our prosperity has been achieved "because of our freedom of trade, better equipment, and our ability to plan and manage.

"Let us not forget that competition is the very life blood of our system" he continued. "American business must rely upon its efficiency and not upon protection from competition for survival. Free enterprise cannot be kept alive unless greater rewards are offered for greater effort. It cannot operate effectively unless the chances for gain are sufficient to encourage the use of resources which would otherwise be unemployed."

Speaking as a member of one of America's great industries, Mr. Browne has summed up the situation in a manner that should meet with the approval of all industry.

Howard Campbell


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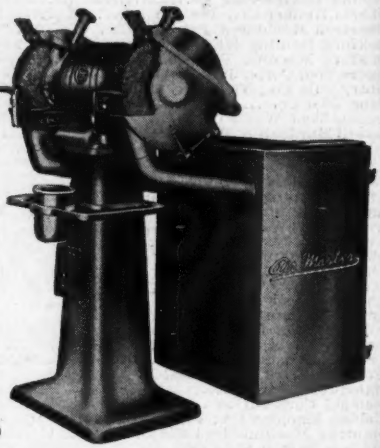
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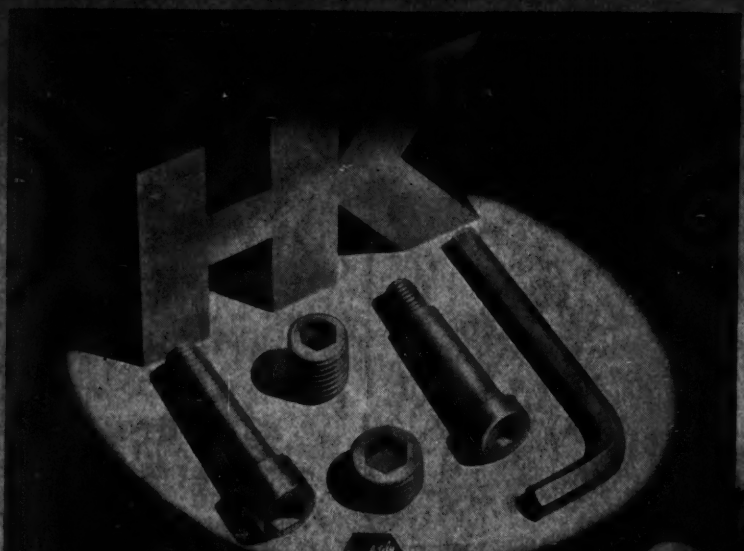
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January, 1944

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. . . And Now

ILLUSTRATED is the workshop of a maker of scientific instruments, spectacles, telescopes, etc., taken from an engraving published in 1810 in the Panorama of Professions. Note that the motive power was by hand or foot, while much of the actual work was done by hand. Compared by the standards of today, there just was no such thing as production. Perhaps the greatest single improvement over the old methods was the advancement in the use of air and hydraulics . . . the application of air or hydraulic pressure for the operation of chucks, work holding and ejecting devices, assembling presses and many other labor saving devices. Let "Logan" Engineers make recommendations on modernizing your plant with the application of "Logan" *Air* and *Hydraulic Equipment*.

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HOW HEALD ENGINEERING SOLVED A WARTIME PROBLEM

Sag was bugbear number one in a propeller plant...sag caused inaccuracy and eccentricity when machining propeller blade shanks... simply because blades were chucked horizontally. Bugbear number two was form tools... maintaining their edges for plunge cutting the blade shank was difficult and unsatisfactory. Inevitably, excessive hand operations were required, and production was slow and costly... so much so that a new and better method was imperative.

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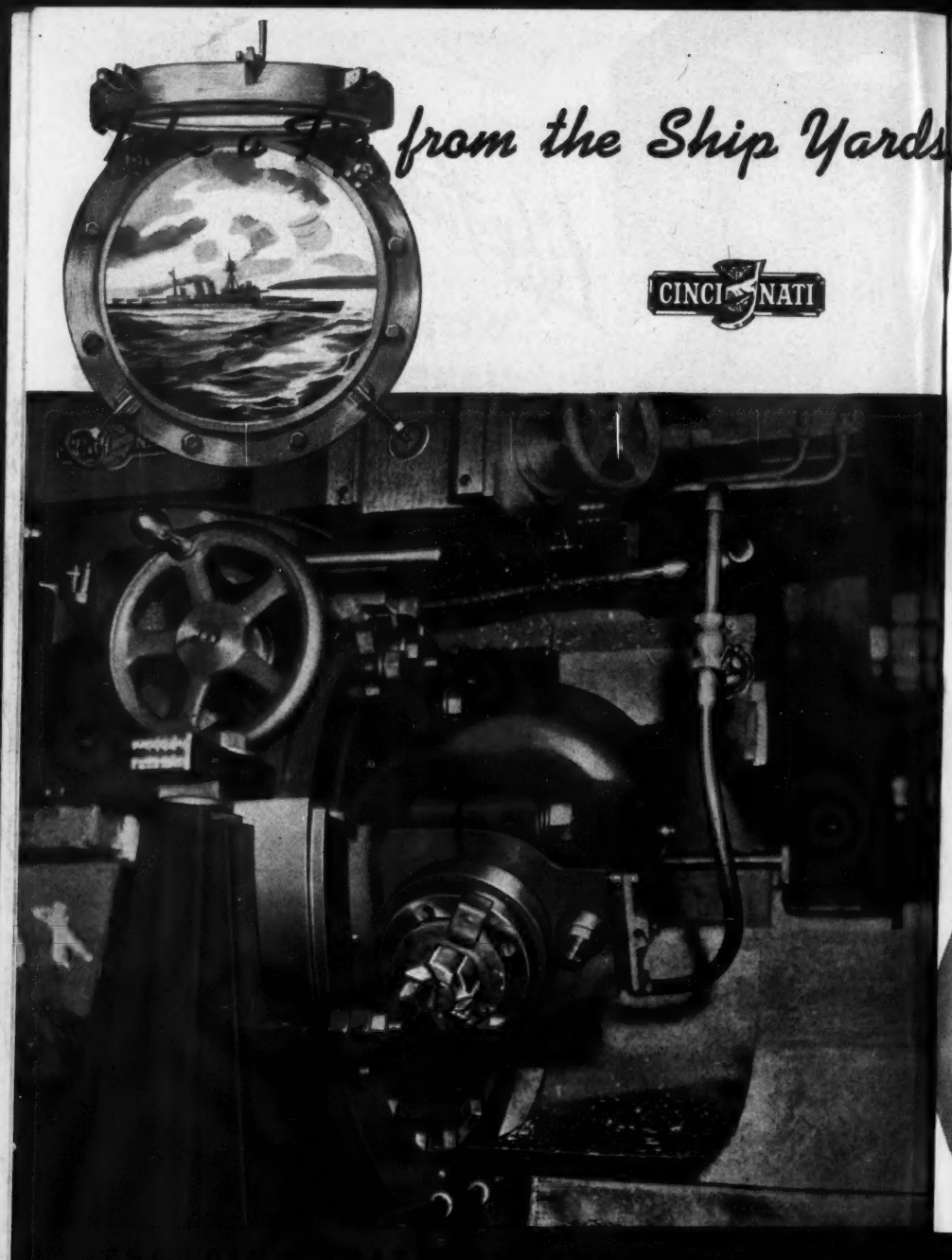


EVEN years from now, you'll have no worries about maintaining accuracy with Gisholt's hardened steel ways. On all Saddle Type Machines, these ways are made of solid high carbon alloy steel and hardened clear through. Keyed to the bed and secured their entire length, they're then finish ground in perfect alignment with the spindle. And they stay that way because their extreme hardness on all bearing surfaces—top, sides, and bottom—practically eliminates wear. This dependable, life-time accuracy is one reason why you'll so often hear the advice from experienced production men: "Do the job *right* . . . do it on a Gisholt."

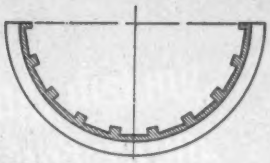
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TOOL ROOM AND MANUFACTURING MILLING MACHINES . . . SURFACE BROACHING MACHINES . . . CUTTER SHARPE ACHINES

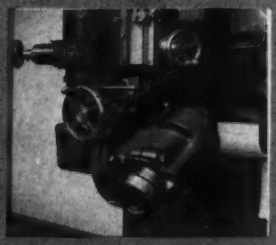


ON MACHINING SLOTS INSIDE HALF-ROUND BEARINGS

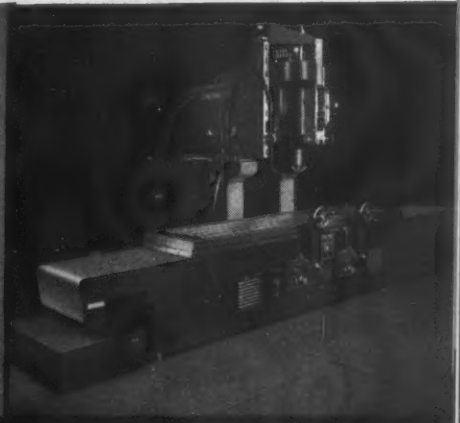
The slots in bearing struts always presented one of the most difficult machining jobs in shipyards. Two or three years ago when production was of little consequence, there was no urge to change, but with the requirements for more and more ships, something had to be done about speeding up this operation. A CINCINNATI engineered Universal Index Milling Attachment, on a CINCINNATI 28" Series Vertical Hydro-Tel Miller, solved the problem. The machine has the capacity and power for milling these large parts, and the attachment is designed so that it may be indexed to several milling positions within a radius of 180 degrees. This method of machining the slots is much faster than the previous method *. . the work requires only one setting and the attachment may be quickly indexed from one cut to the next.*

The attachment is a typical CINCINNATI Service Engineering development for more rapid production through the use of the right machine, fixture, and cutters. Talk over your milling jobs with this group of authorities; they may find a more profitable and productive method for handling your milling operations.

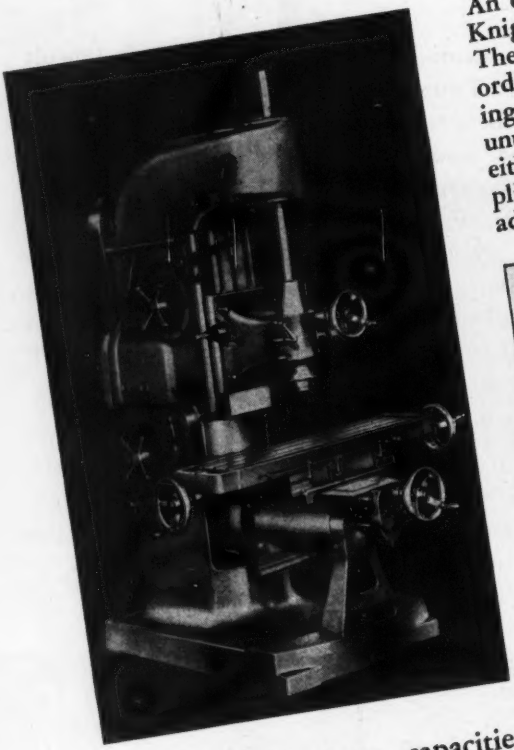
Right: CINCINNATI 28" Series Vertical Hydro-Tel Milling Machine. Specification catalog M-1018-2 gives complete information.



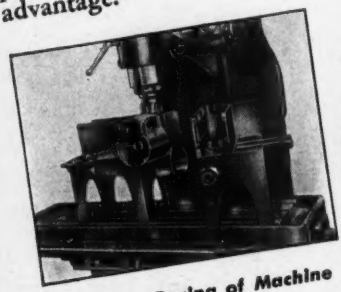
Above: Universal Index Milling Attachment. It has No. 50 standard taper hole; quick change collet; 1½ to 1 speed ratio, index plate for locating angular position of attachment spindle.



Versatility In Knight Millers



An outstanding characteristic of Knight Millers is their versatility. They will handle a wide range of ordinary, plain milling and boring as well as more difficult and unusual machining of parts. In either case, work can be accomplished with a profit-making advantage.



Accurate Boring of Machine Frames without Jig or Layout.

Knight Millers have capacities which greatly simplify many set-ups and are not to be had in other vertical millers. Such features, used individually or simultaneously, broaden the scope of Knight Millers.

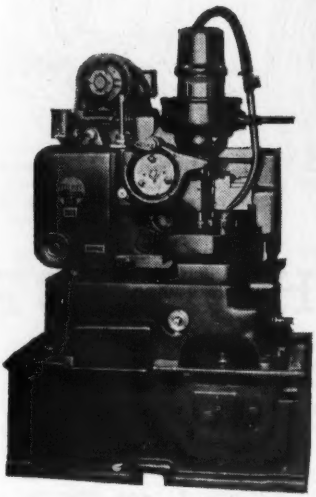
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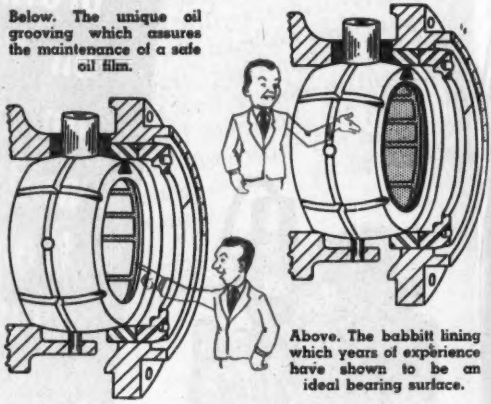
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Above. The babbitt lining which years of experience have shown to be an ideal bearing surface.

KEEP WHEEL SP

It has often been said that the wheel spindle bearing is the heart of a precision grinder. The truth of this statement is very generally conceded.

The degree of both finish and accuracy now required has necessitated a completely different approach to the problem of wheel spindle bearing design. Realizing the trend several years ago, Landis engineers conceived an entirely new kind of wheel spindle bearing which was named the Microsphere. There has been opportunity to check its performance in hundreds of plants and on practically all types of Landis Grinders. Everywhere the results have been so satisfactory that the Microsphere bearing is today considered standard on most machines leaving our plants.

The user enjoys six outstanding advantages, which are:

1. Positive Micrometer Adjustment. Bearing clearance may be readily changed or duplicated by means of a micrometer dial at the outside end. Dial readings are positive and in tenths in terms of bearing clearance.

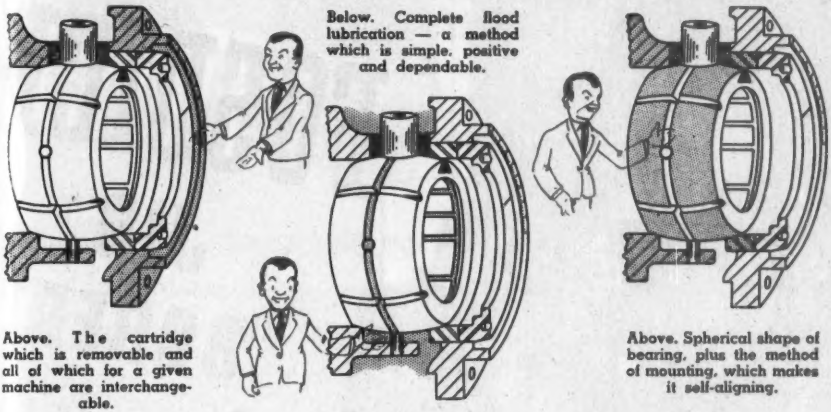
2. Unique Oil Grooving. Oil grooves are so arranged with relation to each other that as the oil film created by the oil from one groove becomes thin, oil from the next groove renews the film and so on around the entire bearing surface. This is an indispensable feature where close clearance necessitates the use of a light lubricant.

3. Made of Babbitt Lined Steel. Bearing is made of steel because of its relatively low coefficient of expansion. Bearing surface is a babbitt lining spun on the steel. For years Landis cap type bearings have utilized this combination of materials with outstanding success.

PRECISION LANDIS GRINDERS

Unusual Performance As Usual

HERE BEARINGS



Above. The cartridge which is removable and all of which for a given machine are interchangeable.

Below. Complete flood lubrication — a method which is simple, positive and dependable.

Above. Spherical shape of bearing, plus the method of mounting, which makes it self-aligning.

INDLES TURNING

4. Easy Maintenance.. Each bearing is mounted in a removable cartridge and all cartridges for a given machine are interchangeable. There is little loss of production time those few instances when a bearing requires inspection or replacement..

5. Flood Lubrication System. Oil slingers on the spindle carry the lubricant to the top of the bearings., where it feeds downward by gravity into the oil grooves. Bull's-eye gauges at front indicate amount of oil in reservoir and flow of oil to each bearing..

6. Self-Aligning. The spherical shape of the bearing., combined with the manner in which it is held in its cartridge, makes it self-aligning. Once properly aligned and rigidly clamped in its cartridge, it is certain to maintain alignment.

Absolute rigidity is inherent in the Landis Microsphere wheel spindle bearing.. Its new features., plus certain elements of design carried over from older Landis bearings., is assurance that every effort has been made to give the user the benefit of all that is best in wheel spindle bearing construction..

Keep your wheel spindles turning on Landis Microsphere bearings . . . they are certain to give you years of trouble-free performance.

LANDIS TOOL CO. WAYNESBORO, PENNSYLVANIA



LANDIS EXCELLENCE



CONTRIBUTES TO VICTORY



409



Versatility of a machine tool is of specific interest to Tool and Die Shops not only from the productive capacity but because of the need for flexibility and ease of set up.

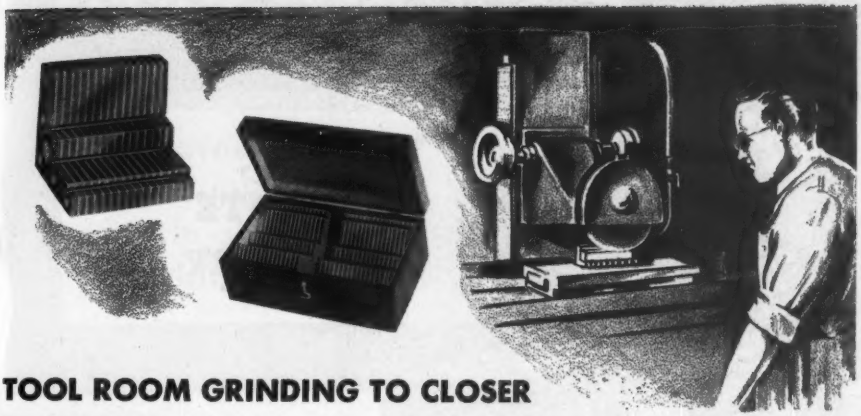
The Fosdick Jig Borer fits into the diversified run of production of the Tool and Die Shop both because of its capacity to handle a wide variety of work and its ease and speed of operation.

Another advantage of the Fosdick Jig Borer is its simplicity. It does not require a high priced operator to turn out accurate work, rapidly, to blueprint dimensions.

Typical of Fosdick adaptability is the illustration of a Jig Borer operating in the plant of the Cadillac Tool and Die Works. Here you see one of the many jobs this machine is called upon to handle during a short period.

If you're interested in flexibility with economy on your jig borer operations you'll be interested in the Fosdick Jig Borer. Write for Bulletin MSJ.

FOSDICK MACHINE TOOL COMPANY
CINCINNATI ... OHIO



TOOL ROOM GRINDING TO CLOSER PRECISION—*can be handled with greater speed and convenience with* SCHERR TOOL MAKERS ANGLE IRONS

Every good tool maker will welcome these new grinding room specialties because they enable him to hold thin work that cannot be clamped and grind it square with utmost accuracy and speed.

SCHERR TOOL MAKERS ANGLE IRONS, placed on your magnetic chuck, provide magnetic right angles having the same holding power as the chuck itself. A series of steps are available on which a wide variety of thin work may be placed and securely held during grinding operations by magnetic force without the use of complicated clamps and attachments. By using a sine bar or bevel protractor work requiring grinding at various angles may be laid out and handled.

Write for complete detailed information on SCHERR GRINDING ROOM SPECIALTIES which include Magne-Blox Angle Iron, Magne-Blox Laminated Magnetic Parallels and V-Blocks, "Little Wonder" Radius Dresser and other tool room and production tools.

SPECIFICATIONS and PRICES

Single Tool Makers Angle Iron—in hardwood case. Overall dimensions: 3" x 3" x3⅜". **Price $23.50.** Matched Pairs Tool Makers Angle Iron—in hardwood case. **Price $45.**





WE NOMINATE FOR GLORY

Gentlemen, he's tired. This patient and venerable creature is the most overworked piece of machinery in the world. For countless centuries the old one-horsepower hay burner was the most efficient engine we had, and he has done much of this world's work.

Today, aeronautical engineers have packed a horsepower into a few ounces of metal, and more than 2,000 horsepower into a single engine. Tolerances are measured in thousandths of an inch, and bearing smoothness is measured in millionths.

There's a reason for such precision as this. Into the cylinders of that finished engine will pour a torrent of 15-ton explosions at the rate of hundreds of blasts every second during the million miles of flight that is the life expectancy of the engine.

And that, brother, is horsepower!

Today, Jones & Lamson machine tools, engineers and service men will be found on every airplane engine production line in America, helping to make possible this miracle of power . . . They are at your service. Call upon them now.

Universal Turret Lathes . Fay Automatic Lathes . Automatic Thread Grinders . Optical Comparators . Automatic Opening Threading Dies

JONES & LAMSON MACHINE CO., SPRINGFIELD, VERMONT, U.S.A.

Profit-producing Machine Tools

MAINE STEEL, INC. *Reports . . .*

"Greatest Time and Money Saver in Die-sinking Machinery in 25 Years!"

"You may remember that about a year ago you sold us a Rotary Head Die-Sinking Machine. We feel that it is time that we told you what we think of it.

The Rotary Head principle has saved us more time and money than any other improvement in Die-Sinking Machinery since Cherrying Attachments were invented more than twenty-five years ago.

The principal reason is that we can sink four (4) impressions complete without moving the work on the table.

This saves three (3) setups out of four (4) when compared to a Rotary Table Machine.

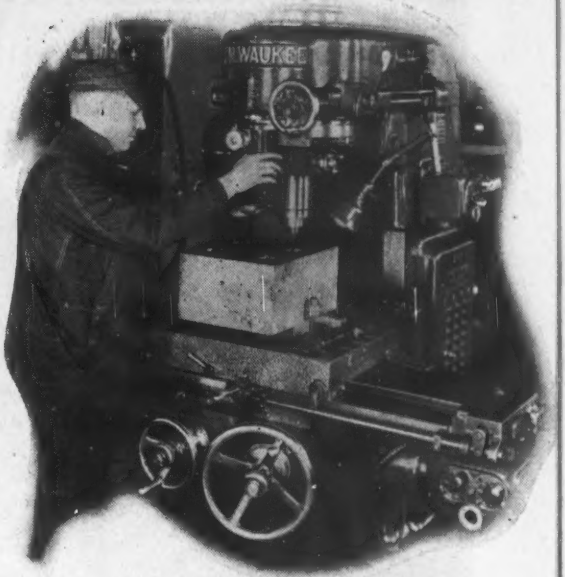
This saving would of course be increased where more than four (4) impressions are needed.

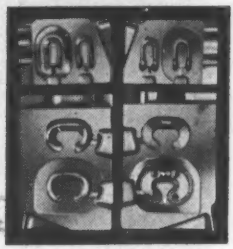
Besides this — the various movements built into this Rotary Head enable us to sink our dies without first laying them out on the Die Blocks.

The machine does its own layout work.

And after a year's experience we can say that these two features have averaged to save us over 30% of our die-sinking time.

Yours very truly,
MAINE STEEL, INC.
A. A. Rines
Foreman—Die Sinking Dept. "





This is typical of the forging dies produced by Maine Steel, Inc. The Milwaukee Rotary Head Miller has saved this firm over 30% in die-sinking time on dies of this type.

Kearney & Trecker's Rotary Head Miller is regarded by the majority of users as the most versatile machine ever designed for die and mold work. Direct — fast — accurate — it reduces initial job preparation and set-up time to the minimum—saves operator's time and assures rapid production of dies and molds. Write for Bulletin No. 1002C for full information on this unusual machine tool.

Rotary Head Milling Machine
Autometric Jig Borers
Center Scope

Kearney & Trecker *Products*
CORPORATION
Milwaukee, Wisconsin
Subsidiary of Kearney & Trecker Corporation

Milwaukee Face Mill Grinder
Milwaukee Midgetmill
Milwaukee Speedmill

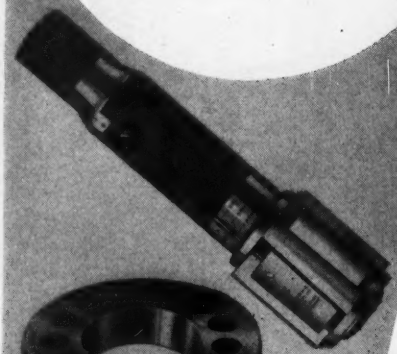
INTERNAL MEASUREMENT

with Accuracy

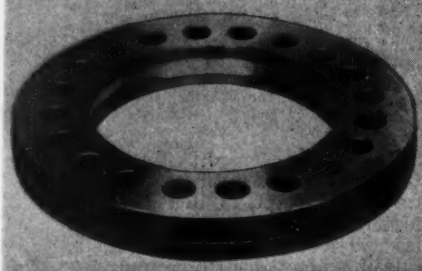
Bath Super Internal Micrometers measure holes—plain or threaded—to one ten-thousandths of an inch, permitting an operator to know at any time the exact size and the amount of metal left to be removed. They save time, reduce spoiled work, and are dependable.

All parts are accurately machined so that the assembled micrometer operates the measuring jaws for easy-to-read graduations on the handle

WRITE FOR ILLUSTRATED BOOKLET.









John Bath & Company, Inc.

WORCESTER • MASS.

Jarvis Flexible Shaft Machines

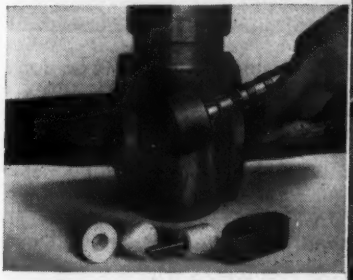
Jarvis Multiple-Speed Flexible Shaft Machines make it possible for the metal craftsman, the finisher, and the cleaner to have a universal tool suitable for rotary filing, sanding, grinding, polishing, and buffing. There are Jarvis Flexible Shaft Machines and Tools that will satisfactorily meet your requirements.

Write for our new catalog MFTI.



Jarvis Flexible Shaft Machines are used extensively in the aircraft engine industry and aluminum foundries; also in mold and metal pattern shops.



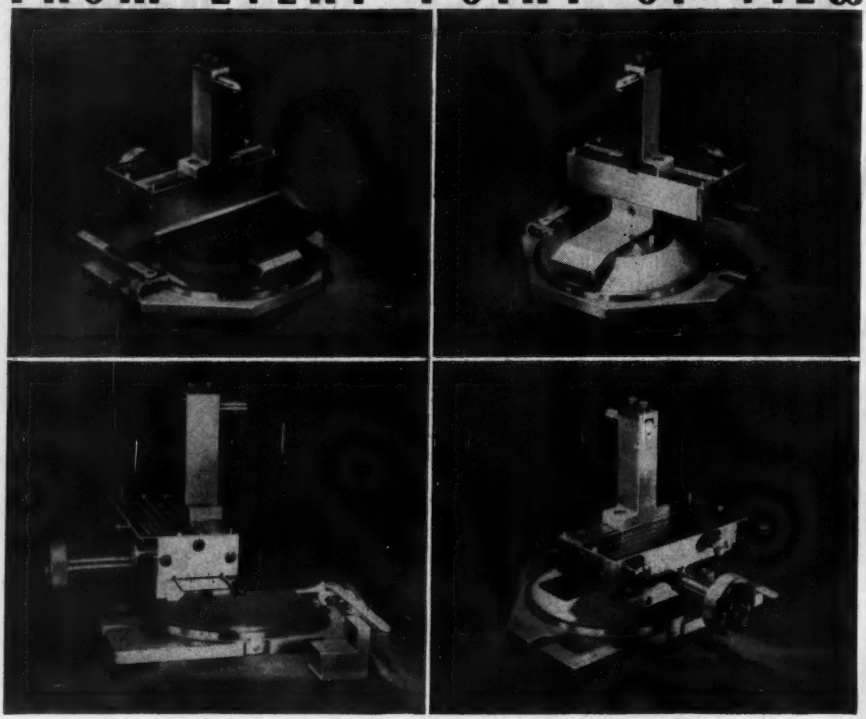


Jarvis Tools are made for efficiency and long life. For use with Jarvis Flexible Shaft Machines, in any finishing or cleaning operation.

THE CHARLES L. JARVIS CO., MIDDLETOWN, CONN.

TAPPING ATTACHMENTS • FLEXIBLE SHAFT MACHINES • GROUND ROTARY FILES

FROM EVERY POINT OF VIEW



Whether the wheel dressing job to be done is simple or complicated, fine or rough, large or small, from every point of view, the Vinco B-1 (Angle Tangent to Radius) Dresser is the one to use. Grinding wheels up to 14" in diameter may be dressed, either convex or concave with radii up to 2½" diameter with any combination of angles tangent to any radius. The B-1 Dresser may be used on practically all surface grinders and on external, internal and cutter grinders (in some cases, Vinco special Sub-Bases must be used). You can't go wrong with a Vinco B-1– and you can get immediate delivery from stock.

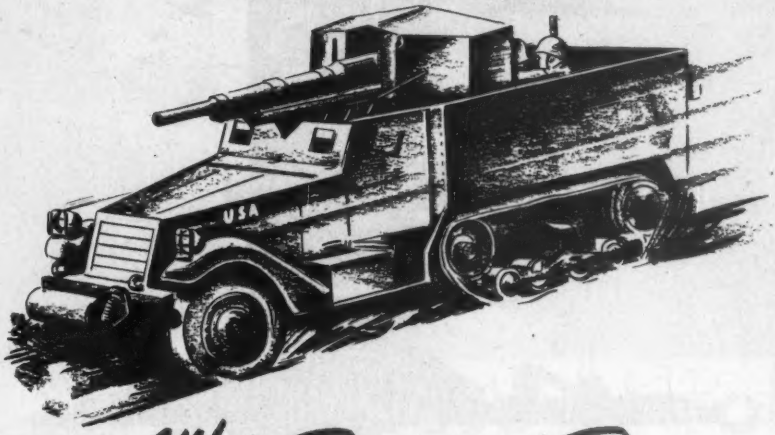
VINCO CORPORATION • 8861 SCHAEFER HIGHWAY, DETROIT 27, MICHIGAN

MILLIONTHS OF AN INCH FOR SALE BY VINCO

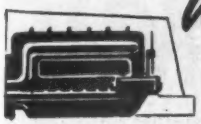
Semi-Automatic Hydraulic Spline and Gear Grinder • Optical Master Inspection Dividing Head • Involute Checker • Angle Tangent to Radius Dresser • Index Plates • Precision Vises • Sine Bars • Straight-side Spline, Serration Spline, Involute Spline and Helical Spline Plug and Ring Gages • Thread Ring Gages and Masters • Spur and Helical Master Gears • Munition Gages • Propeller Hub Gages • Built-up and Special Gages • Gear Rolling Fixtures • Spline and Index Fixtures • Hydraulic Power Control Utilization and Distribution Units • Engineering, Design and Development

"American"

GRINDING WHEELS



When Precision is Power



Under its business-like hood beats the heart of Uncle Sam's powerful half track. Loaded with machine guns, armor, and men, the half track fights its way in all parts of the world, through mud and sand, snow and dust. "American" Grinding Wheels do their part in maintaining the accuracy vital to power, grinding piston pins, crankshafts, and cylinder bores. Wherever precision powers the war, "American" Wheels are daily proving their high quality and grinding ability.

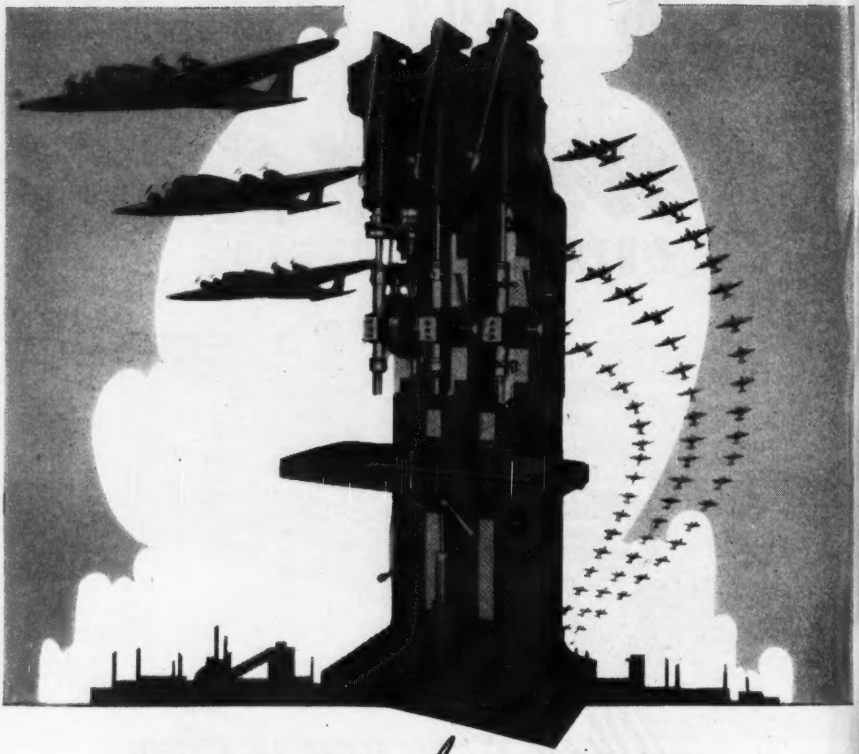
Let us know your grinding needs.



AMERICAN EMERY WHEEL WORKS

ESTABLISHED 1898

PROVIDENCE · RHODE ISLAND



ENROUTE *to* VICTORY

. . . Right—that's where we are heading; that's why it's important to make sure we leave no stone unturned to speed that journey. Our Avey MA-6 will maintain your high production levels. Built in No. 2 *(capacity in cast iron, 7/8")* and No. 3 *(capacity in cast iron, 1 1/4")* sizes. One to six spindle units, either size. Six speed machine, two speed motor with three mechanical changes through gearing. Speed range is eight to one. Push button control. The above photograph shows the MA-6 equipped with three spindles, the Aveymatic Feed, Hand Feed, Tapper.

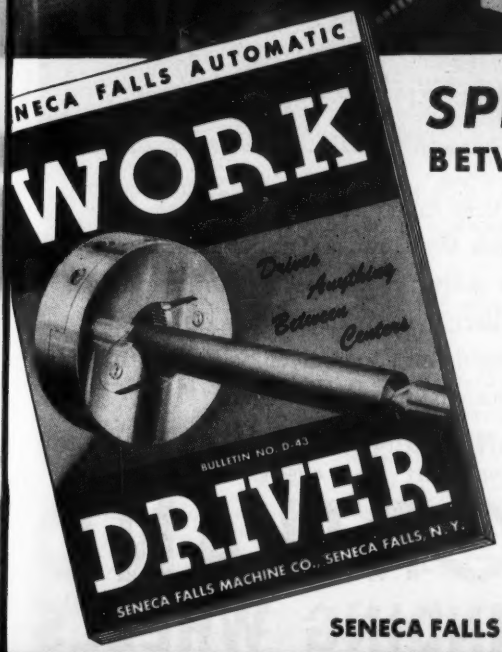
Famous for their versatility, this is a Standard type Avey Drilling Machine.

ARMY E NAVY

THE AVEY DRILLING MACHINE CO.
Cincinnati, Ohio, U. S. A.

Avey





SPEED UP YOUR BETWEEN-CENTERS WORK

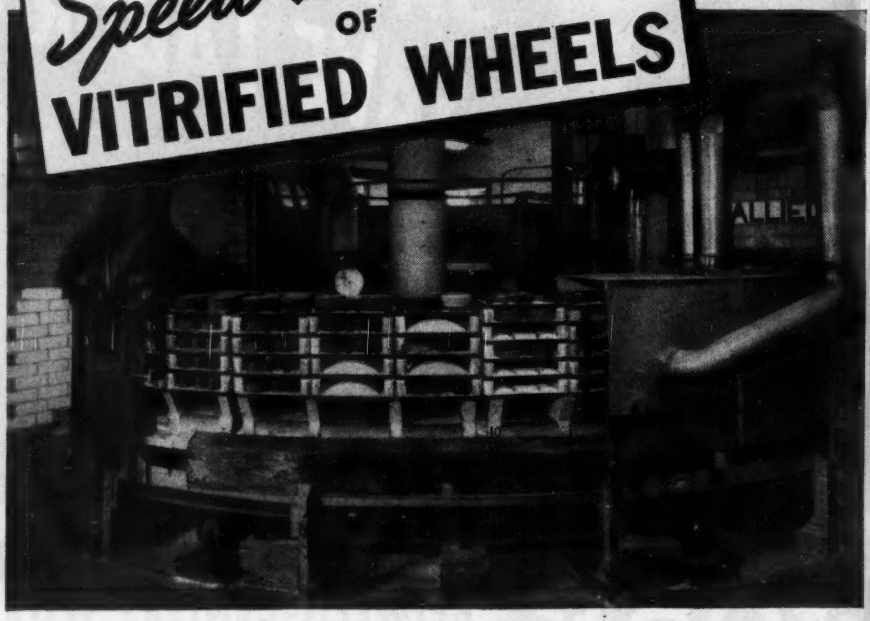
● The Seneca Falls Automatic Work Driver is a self-centering, quick-acting Driver designed to eliminate dogging time, thus permitting one operator to operate two or more machines. Its positive grip prevents slippage and resulting tool breakage. It provides greater safety for the operator since there are no projecting screws or sharp corners to catch clothing or injure hands. It can be used on any type of engine lathe, multiple tool lathe and on plain or universal grinders. Can also be used for certain work on turret lathes.

Now available in eighteen *standardized* models which can be ordered from our new catalog. Write for your copy today and utilize this proven Driver to help speed your war production.

SENECA FALLS MACHINE CO., SENECA FALLS, N. Y.

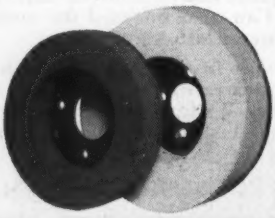
LATHE NEWS from SENECA FALLS

TO *Speed Deliveries* OF VITRIFIED WHEELS



Vitrified Bonded Wheels are very much in the Cortland production picture — and the Circular Continuous Tunnel Kiln shown here is a step toward better delivery on this type of grinding wheel, in sizes of 16″ and smaller. You can depend upon Cortland for quality — and for better deliveries than ever before when you want them.

CORTLAND GRINDING WHEELS CORP.
10 CORTLAND STREET CHESTER, MASSACHUSETTS



CORTLAND GRINDING WHEELS

PLAN-O-MILLING



"FIRSTS" WITH PLAN-O-MILL

1st to install General Electric's remarkable new Thymo-trol electronic feed control!

1st planetary to mill external threads with multiple thread cutter!

1st planetary to coordinate feeds and speeds!

1st to provide absolute control of feed-in!

FAST, ACCURATE MILLING OF CYLINDRICAL FORMS

You get the speed and high production of special purpose equipment when you replace wasteful, obsolete machines with Plan-O-Mill.

Yet Plan-O-MILL is flexible. A slight tooling change adapts it to a wide variety of thread milling and form milling jobs.

Plan-O-Mill saves manpower too! It is semi-skilled or unskilled labor. One man or woman can operate two or more Plan-O-Mills.

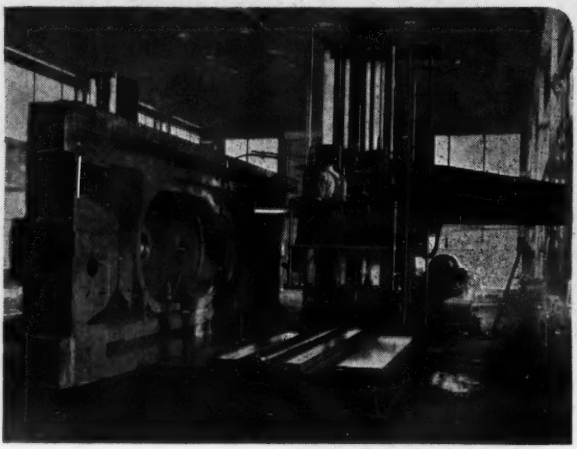
Find out about Plan-O-Mill today! Contact your machinery supplier or write direct.

PLAN-O-MILL
CORPORATION

1511 East Eight Mile Road · Hazel Park, Michigan

OHIO'S STEP UP PRODUCTION

Orders for this machine are being shipped promptly.



This big Ohio Horizontal handled all the boring, drilling and milling operations on a 22000 - pound cast steel base for a power shovel. Performance was accurate, speedy and completely satisfactory.

Ohio's portable control (which can be ordered for the machine shown above) is a demonstrated time-saver, simplifying and speeding up many an otherwise unprofitable job. The power, precision and convenience traditional in Ohio Dreadnaughts are promoted by such features as these: unit construction, nitrided spindle, anti-friction bearings, built-in electrical power rapid traverse, narrow guide construction for all moving parts, push-button control for start-stop, forward-reverse and run-jog of the spindle, continuous spindle feed of 72" with full-length, spindle support, internal gear-tooth type clutches, automatic lubrication, multiple-splined shafts with splines milled from the solid for all sliding gears and clutches.

Heavy duty and extra heavy duty models, floor and table types, 5" and 6" spindle sizes. Full range of accessories. Ask for Bulletin 300.

THE OHIO MACHINE TOOL COMPANY, KENTON, OHIO

OHIO DREADNAUGHT

HORIZONTAL BORING, DRILLING AND MILLING MACHINES • SHAPERS • PLANERS

NEVER TOO YOUNG OR TOO OLD

to

CUT PERFECT THREADS



RIVETT THREAD TOOL

There is an army of unskilled operators ready to cut perfect threads with the Rivett Thread Tool. Not new, but proven, this tool helped win the last war and is again ready to throw its weight into Victory Production.

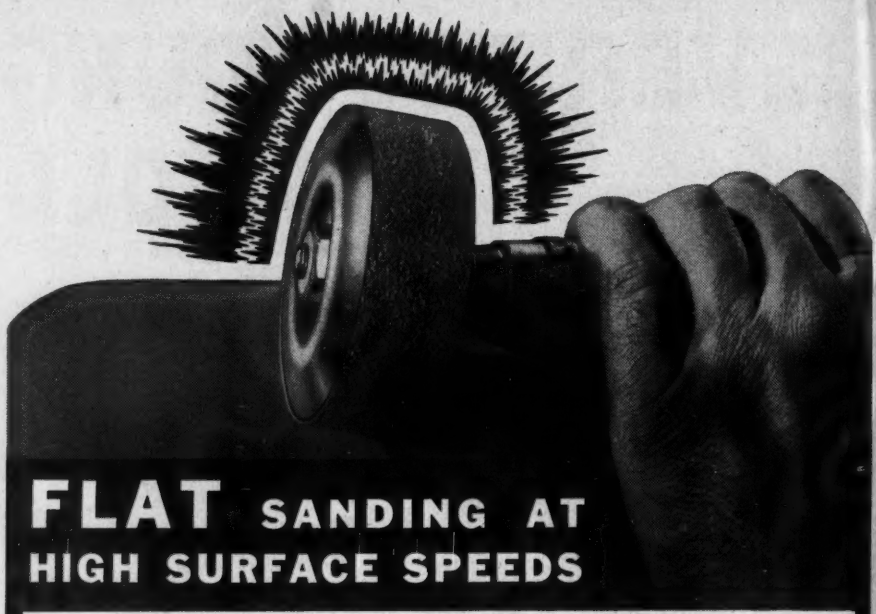
The Rivett Thread Tool is an attachment for any screw cutting engine lathe, and takes the place of single point thread tools commonly used. The tool is a holder for a ten tooth cutter with means for indexing the cutter to present each of the ten teeth progressively to the work. The first nine teeth rough out the thread in nine heavy, measured cuts, the tenth tooth finishes the thread. The responsibility of the operator is reduced to indexing the cutter when reversing the lathe. The thread tool does the rest.

Descriptive bulletin and ordering instructions are available on request.

RIVETT

LATHE & GRINDER INC.

BRIGHTON·BOSTON·MASS



FLAT SANDING AT HIGH SURFACE SPEEDS

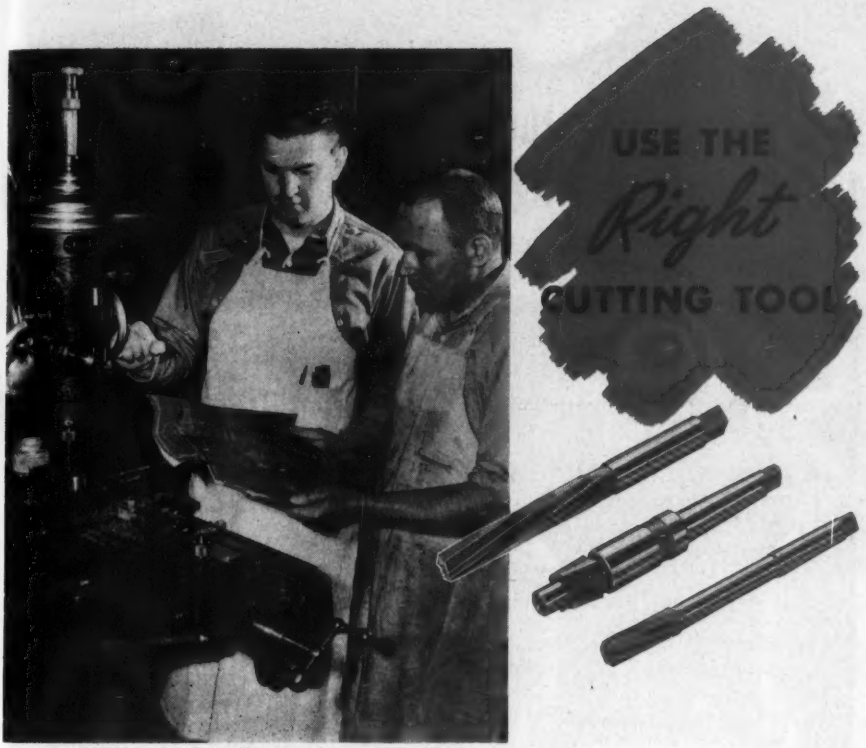
Here is the answer to your high speed sanding problems . . . an expanding rubber drum that cannot bulge in the center at high surface speeds. It presents a *flat surface* to the work — at speeds as high as 9,500 surface feet per minute.

It was developed by Pratt & Whitney Engineers to meet demands by the aircraft engine and propeller industries, yet has proved itself valuable in a thousand and one other uses where the drum surface must remain FLAT at highest speeds.

FULLY PATENTED. Although abrasive belts can be changed on this drum as quickly as on other expanding rubber drums — there is no "flow" of the rubber as the R.P.M.s go up. This is due to its patented design. As in all other Pratt & Whitney products — only the highest standards of materials and workmanship prevail. Each part is made to close tolerances, assuring accurate balance and extremely smooth running at all speeds. Because there is no "bulge" — more of your abrasive contacts the work, and your sanding production per hour and per belt is greater.

Whatever your sanding problem may be, the P&W Engineers have probably run into similar problems in serving a wide variety of industries.
Take advantage of our experience. Write us your problem —
and send for details of this sanding drum that stays FLAT

PRATT & WHITNEY
Division NILES-BEMENT-POND COMPANY
KELLERFLEX SALES DIVISION
WEST HARTFORD, CONN.



Selecting for each job the *right* cutting tool — right type, right form, right size — is the first rule of tool conservation. Proper choice in the first place, and care to see that this choice is maintained, will help produce more and better work.

NATIONAL

NATIONAL TWIST DRILL & TOOL

TWIST DRILL AND TOOL COMPANY

HOME OFFICE AND FACTORY—DETROIT, MICH.

Are you getting the MAXIMUM from your cutting tools?







ASK FOR BULLETIN No. MM-14-12 **ASK FOR BULLETIN No. MM-14-22**

Tools must be conserved in these days of limited resources. Every tool thrown away means loss in materials and production time—and a loss to the nation's stockpile of critical war supplies.

Today, Tool Conservation is a "must" in every plant. Covel's two cutter and tool grinders—the No. 12 and the No. 22—will grind and condition your tools with efficient precision at great savings in time, money, and materials.

Many broken or worn tools now consigned to the scrap pile can be rescued and with these Covel machines reclaimed for valuable work—perhaps for a new kind of job.

"Tools are Weapons—Treat 'Em Right" with "Covels." Send today for Covel Bulletins No. MM-14-12 and MM-14-22 for the full story of what these machines can do for you.

GRINDING MACHINERY SINCE 1874

COVEL INDUSTRIAL GRINDERS

COVEL MFG. CO. BENTON HARBOR MICHIGAN U. S. A.



ARRESTS PROGRESSIVE WEAR

It is hard to conceive that contacting surfaces can be operated against each other and not cause wear. But tests prove this is not unusual when LUBRIPLATE Lubricants are used. This "Modern Lubricant" is more than top quality petroleum. It contains elements not found in any other oils or greases.

LUBRIPLATE maintains a wear-resisting, load-bearing film on shafts, bearings, gear teeth and other contacting moving machine parts. The destructive consequences of friction are therefore reduced to an unbelievable minimum. LUBRIPLATE protects machine parts against rust and corrosion. Its long life and stay-put properties make LUBRIPLATE very economical.

Don't take our word for the above statements. Let us send you data from scientific tests and case histories that prove that LUBRIPLATE arrests progressive wear. Write for a copy of "The LUBRIPLATE Film" written especially to serve your industry.

Rx FOR YOUR MACHINERY

No. 2—Ideal for general oil type lubrication. Ring oiled bearings, wick feeds, sight feeds and bottle oilers.

No. 0—Because of its high film strength and long life reflects outstanding performance in most types of enclosed gears (speed reducers).

No. 1½—One of the most popular grease type products for general application by pressure gun or cups.

No. 7½—For a wide range of grease applications, especially at temperatures above 200 degrees F.

No. 130-AA—Known nationwide as the superior lubricant for open gears, heavy duty bearings, wire rope, etc.

BALL BEARING—This is the LUBRIPLATE lubricant that has achieved wide acclaim for use in the general run of ball and roller bearings operating at speeds to 5000 RPM and temperatures up to 300 degrees F.

LUBRIPLATE DIVISION
FISKE BROTHERS REFINING COMPANY
NEWARK, N. J. **SINCE 1870** TOLEDO, O.
WRITE FOR THE NAME OF THE DEALER NEAR YOU



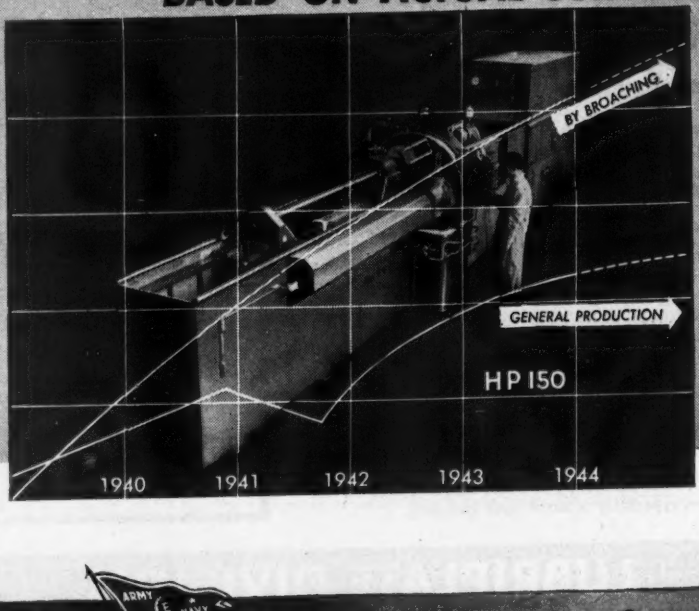
PROTECTION...

of Vital Production

of Vital Manpower

of Vital Time

BROACHING PRODUCTION FIGURES BASED ON ACTUAL SURVEY—



ARMY E NAVY

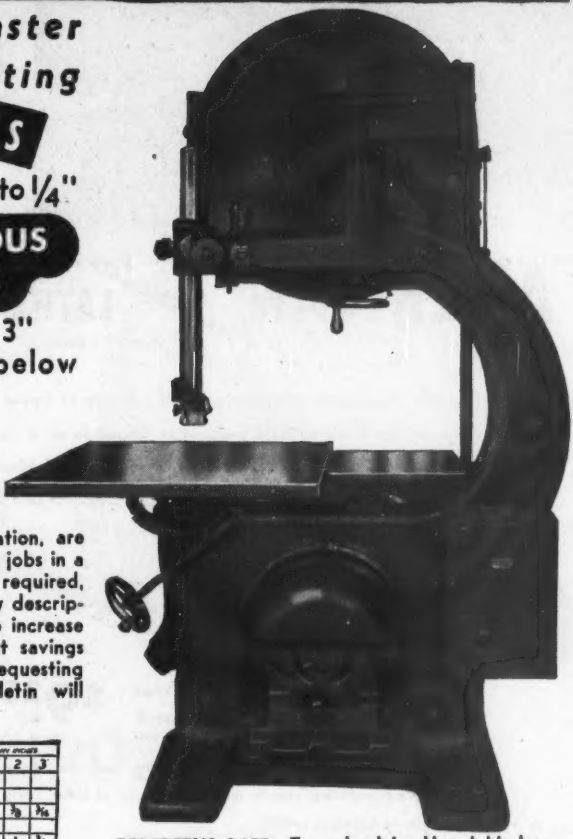
The APPOINTE Machine Tool Company

HUDSON, MASSACHUSETTS, U.S.A.

TANNEWITZ HIGH SPEED METAL CUTTING BAND SAWS

. . . a far Faster Means of Cutting TEMPLATES from SHEET STEEL up to 1/4"

NON-FERROUS MATERIALS of all kinds up to 3" thick — see chart below



SAVE THEIR COST IN SHORT ORDER

These superb machines, delivering over two miles of saw blade travel per minute without vibration, are doing hundreds of metal cutting jobs in a fraction of the time previously required, in metal working plants of every description throughout the country. To increase production and make important savings get the details NOW! A line requesting Metal Cutting Band Saw Bulletin will bring them to you promptly.

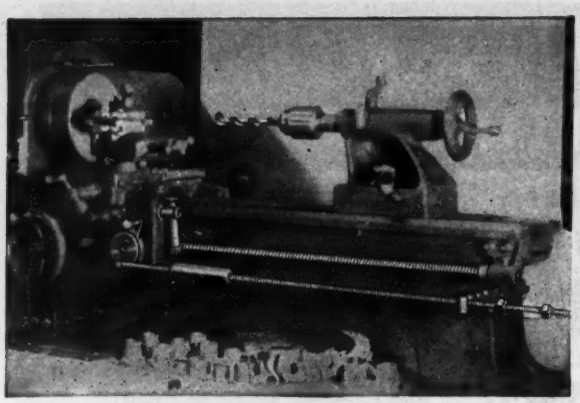
	Thickness and Feed per Second in Inches							
KIND OF MATERIAL	1/32	1/16	1/8	1/4	1/2	1	2	3
Mild Steel	32-24	6	3	1				
Stainless Steel	6	2	1	.				
Yellow Brass, Zinc	24	12	6	3	1½	¾	⅜	3/16
Bronze or Copper	6	3	1½	¾	⅜	3/16		
Aluminum	24-36	18	9	4½	2	1⅛	1	3/16
Duraluminum	24	12	6	3	1½	1	⅜	½
Single Plymetal				6	4			
Double Plymetal				4	3			
Plywood	24-36	24	20	16	12	6	3	1½
Asbestos Board	12	6	3	1½	¾			
Fibre (Hard)	24	12	6	½				
Paper Board	24	18	12	4	2	½		
Masonite	24	18	12	6	3	1½	¾	⅜
Bakelite	12	6	3	1½	¾	⅜	3/16	

PERFECTLY SAFE: Two-wheel Lockheed Hydraulic Brakes automatically and instantly stop the wheels in case of saw blade breakage — completely guarded.

Send for bulletins on Single and Variable Speed Foundry Band Saws. Also Di-Saws, combination band saws for sawing, filing, polishing.

Made by Sawing Machinery Specialists

THE TANNEWITZ WORKS, GRAND RAPIDS, MICHIGAN



MAKES LATHE WORK SIMPLER AND FASTER!

AMERICAN *Automatic* LATHE STOP GAUGE

PATENT PENDING

This new attachment accurately sets the length of travel of the lathe carriage for one or more cuts so that duplicate pieces can be made on a mass production scale. Once a stop is set, every piece of work will receive a cut of identical length with unfailing accuracy. The gauge stops the carriage only; it does not shut off the lathe motor or power feed.

- INCREASES PRODUCTION
- CUTS SET-UP TIME
- REDUCES REJECTS
- PREVENTS ACCIDENTS
- PERMITS USE OF SEMI-SKILLED LABOR
- EASILY ATTACHED

MODEL AL-2 — for 24" centers. Prices on other sizes furnished on request. **$9.25**

Quickly installed on Logan, Atlas, South Bend, and other make lathes. When ordering, specify make and model of lathe, swing and distance between centers.

DEALERS' INQUIRIES INVITED

Can Be Used 3 Ways:
1. AUTOMATIC
2. SEMI-AUTOMATIC
3. MANUALLY

SCHULTZ & ANDERSON CO.

109 EDISON PLACE, NEWARK, 5 N. J.

MANUFACTURED BY THE AMERICAN PRODUCTS CO.

"Come Hell Or High Water" It's Got The Stuff

FEATURES
You Will Appreciate

- Poppet type.
- Resilient synthetic rubber seat.
- Positive seal.
- Leak-proof packing.
- Internal parts of stainless steel.
- New Heavy Duty solenoid.
- Compact design.
- Rugged construction.
- Longer life.
- High speed.
- Continuous duty cycle.
- Low current consumption.
- Permanent piping.
- Quiet operating.



ROSS Air Control VALVES

THE BRIDLE FOR AIR HORSEPOWER

This ROSS #835

is a newly developed ¼"—3 or 4 way, heavy duty, industrial type valve for the control of double acting air cylinders . . . may be used for ordinary applications or at speeds as high as 400 cycles per minute on a continuous duty basis . . . it's the valve you've been asking for . . . write for detailed information.

★ ★ ★ ★ ★ ★ ★ **ROSS Operating VALVE CO.** ★ ★

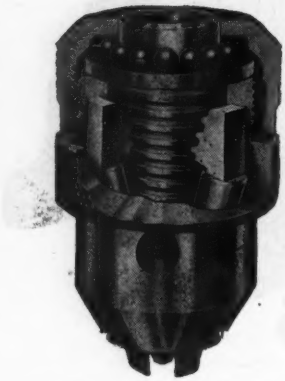
6484 Epworth Boulevard . . Detroit 10, Michigan

A SIZE AND TYPE FOR EVERY OPERATION

Whoa!



Lay that old key down babe . . . that's an Ettco-Emrick KEYLESS DRILL CHUCK



MADE IN 5 SIZES

for No. 0 to ⅝" drills. Also available for portable drills and with standard straight shanks for turrets.

"That key is only a relic of the days when we used to waste time and strength around here tightening and retightening chucks which needed keys.

"But that's all over since we got those Ettco-Emrick Keyless babies. All you have to do with them is turn the body by hand just enough to hold the drill —no strength needed. Drilling action does the tightening, and so the heavier the load the tighter they hold. Drills can't slip."

Yes, the time, energy and trouble-saving keyless feature is one reason you find Ettco-Emrick Drill Chucks favored by shopmen all over the country. And another is that you get this great advantage in chucks which are also superior in quality, precision and ruggedness.

If you don't know these chucks, get details in **BULLETIN No. 6.** Your request will bring a copy by mail.

ETTCO TOOL CO.

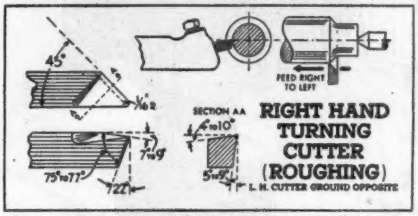
598 Johnson Ave., Brooklyn 6, N. Y.
DETROIT • CHICAGO

25 YEARS OF SPECIALIZATION IN DRILLING AND TAPPING

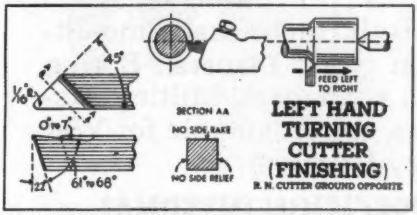
THE HOW AND WHY OF
WILLIAMS
DROP-FORGED TOOLS

GRINDING CUTTERS FOR WILLIAMS' TOOL HOLDERS . . . DATA SHEET F

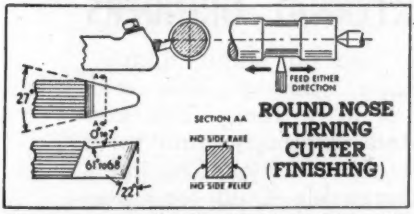
Covering various cutters used with Williams' Tool Holders in machining brass and bronze. Actual grinding (not applied) angles are given in each case. Sufficient latitude is indicated to accommodate the various compositions of brass and bronze — the softer the material the more acute the cutting angle.



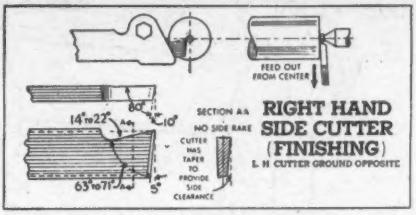
Above cutter is used with Williams' Turning-Tool Holders Nos. 000-S to 6-S, 000-R to 6-R and 000-L to 6-L.



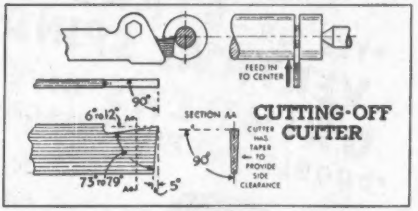
Above cutter is used with Williams' Turning-Tool Holders Nos. 000-S to 6-S, 000-R to 6-R and 000-L to 6-L.



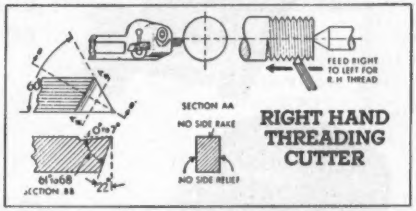
Above cutter is used with Williams' Turning-Tool Holders Nos. 000-S to 6-S, 000-R to 6-R and 000-L to 6-L.



Above cutter is used with Williams' Cutting-Off and Side Tool Holders Nos. N-020-R to N-25-R, N-030-R to N-35-R, and N-030-L to N-35-L.



Above cutter is used with Williams' Cutting-Off and Side Tool Holders Nos. N-020-R to N-25-R, N-030-R to N-35-R, N-030-L to N-35-L, NS-20 to NS-23, NS-30-RA and NS-30-R to NS-33-R.

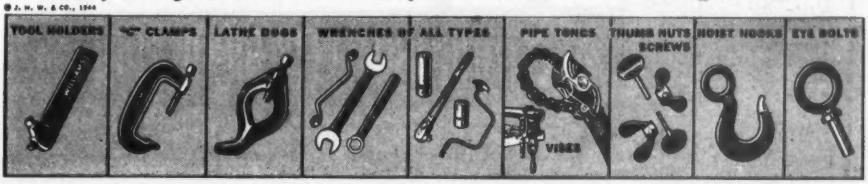


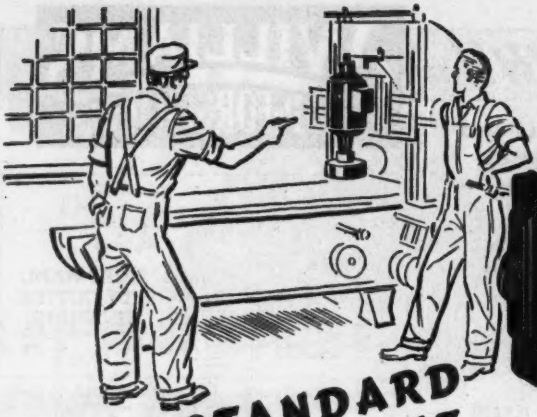
Above cutter is used with Williams' Spring Threading-Tool Holders Nos. S-50, S-51 and S-52.

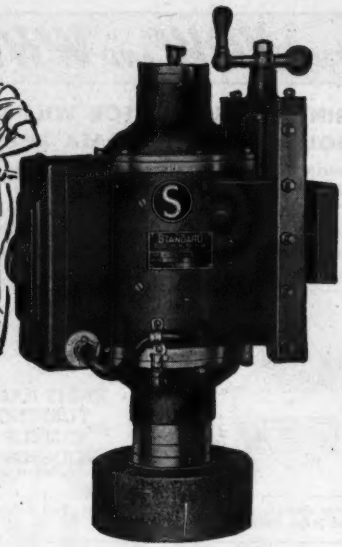
Data Sheets A, B, C, D & E on this subject have already appeared. Additional Data Sheets on grinding of other cutters for Williams' Tool Holders will follow. Reprints of Data Sheets are available on request, either punched and trimmed to fit standard 3-ring binder or plain for bulletin board use. Specify type wanted when ordering.

Sold by Leading Industrial Distributors Everywhere . . . J. H. Williams & Co., Buffalo 7, N. Y.

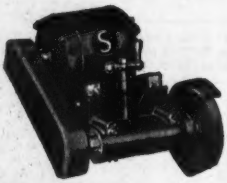
© J. H. W. & CO., 1944



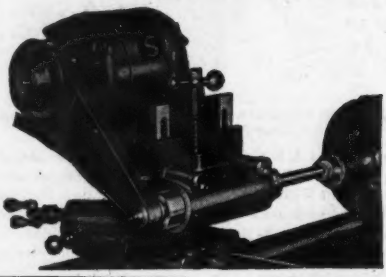




"YES SIR—STANDARD VERTICAL SPINDLE GRINDERS GIVE US 'DOUBLE PURPOSE' MACHINES"



Right—it can be easily mounted on your Planers, Boring Mills, Shapers, Milling Machines, etc. Adaptable for Wet or Dry Grinding.



PRECISION INTERNAL-EXTERNAL GRINDERS

For use on Lathe, Shaper, Planer, Boring Mill, etc. A 2 in 1 Tool—You can grind externally, and in a few minutes mount an interchangeable Quill for internal grinding up to 24" deep.

Write for Catalog 43, illustrating a wide range of Grinding Equipment up to 30" wheels. Buffing and Polishing Machines up to 25 H. P., and Speed Lathes.

The STANDARD ELECTRICAL TOOL Co.

CINCINNATI • OHIO

2491 River Road
Cincinnati 4, Ohio


1,000,000 WITH STEEL
X 10
10,000,000 WITH FIRTHITE
FIRTHITE
SINTERED CARBIDE
MULTIPLIES
DIE LIFE AND
PUNCH LIFE
BY 10!
FIRTHITE
FIRTHITE
10 MILLION
ROTOR LAMINATIONS
PRODUCED WITH
FIRTHITE DIE AND
PUNCH
1 MILLION
ROTOR LAMINATIONS
PRODUCED WITH
STEEL DIE AND
PUNCH
FIRTHITE Lamination Dies have blanked, on one grinding, more pieces than an alloy tool-steel die punched in its entire "life." (On this operation a good steel die produces about a million pieces.) This Firthite Die has produced, with only a few honings, over ten million pieces and may be good for as many more.
Firthite Dies retain their original sharpness much longer than any steel dies. They cut clean and free—reduce burring, distortion, dimpling, and buckling. Firthite Dies also resist chipping or breaking, even in case of a miscut. They are superior for notching as well as blanking. A Firthite Engineer will gladly give you details.
STEEL COMPANY

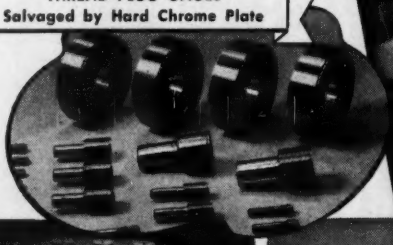
These Are Typical of

LINCOLN PARK GAGES AND NON-CUTTING PRECISION TOOLS



CARBOLOY

THREAD PLUG GAGES
Salvaged by Hard Chrome Plate

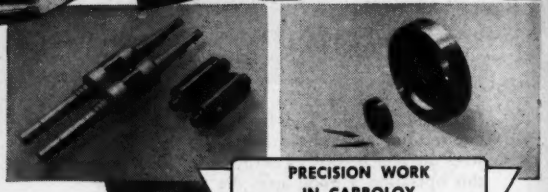




CHROME PLATE
NEW and SALVAGED



STEEL



PRECISION WORK
IN CARBOLOY



For full information on any of the products pictured here, see your nearest Lincoln Park representative or write directly to the plant.



CARBLOX CEMENTED-CARBIDE
GAGE BLOCKS

ARMY E NAVY

LINCOLN PARK TOOL and GAGE CO.

LINCOLN PARK, MICHIGAN



The Flying Lathes of the Air Corps

One of the toughest jobs of the Air Corps Technical Service is to get disabled planes back into the air when they have been forced down in remote locations. No matter where the plane is grounded, skilled technicians must get there quickly with all the tools and equipment required to make emergency repairs.

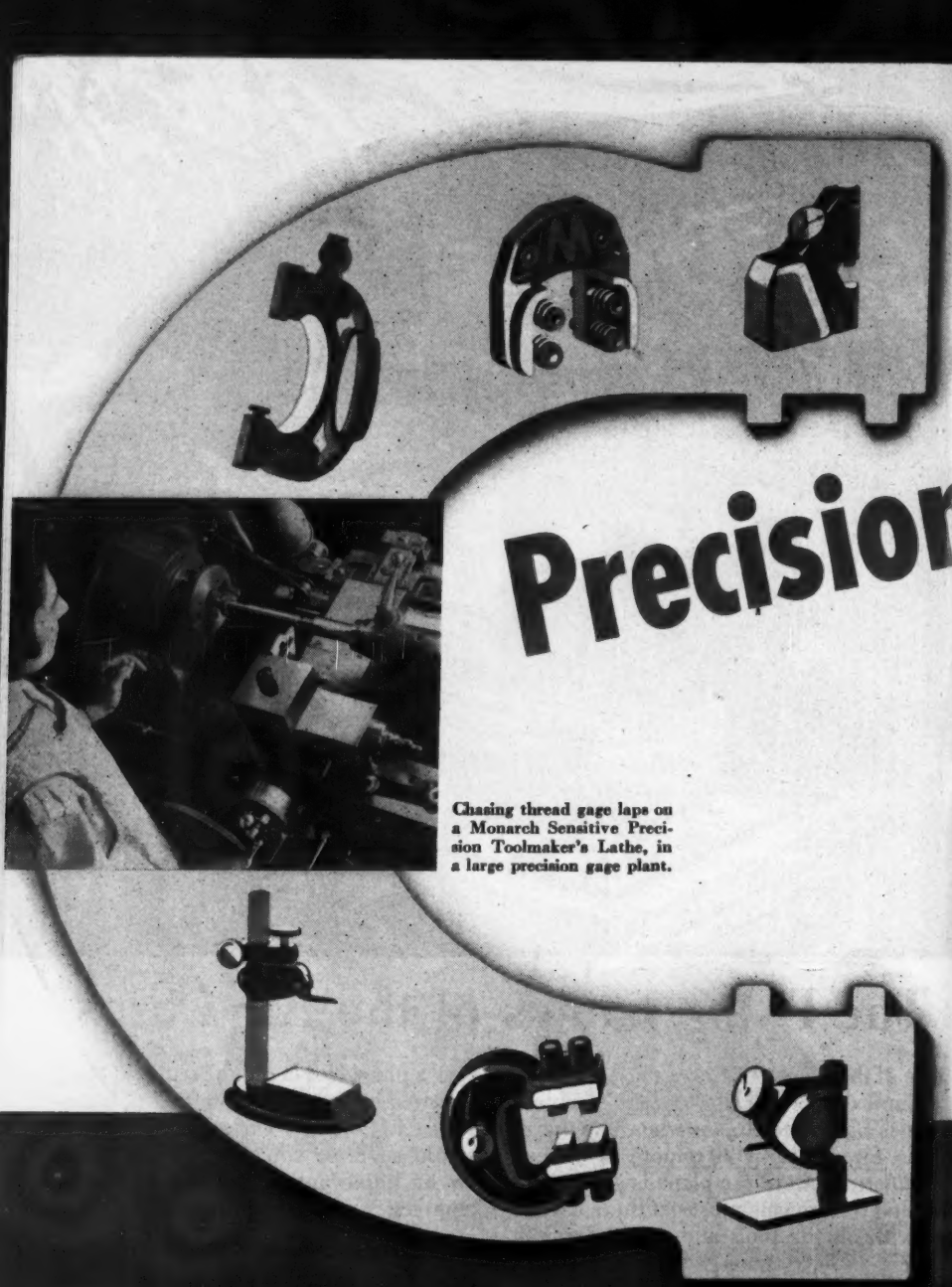
Precision machine operations are sometimes required—so the Air Corps is prepared to fly a Precision Lathe wherever a plane can land. Packed in special, lightweight cases and fitted with accessories for doing a variety of work that would surprise you, these flying lathes are an important part of the Air Corps' emergency service equipment.

We are proud that South Bend Lathes have been selected for this important service—one of many vital assignments that are keeping South Bend Lathes busy for the duration.

SOUTH BEND LATHE WORKS

South Bend 22, Indiana — Lathe Builders for 37 Years

Buy Bonds



Chasing thread gage laps on a Monarch Sensitive Precision Toolmaker's Lathe, in a large precision gage plant.

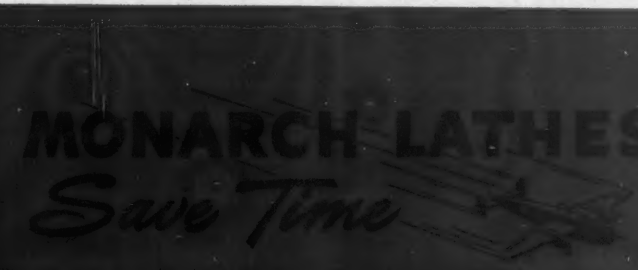
Gages came first..

Before war production could start, precision gages to insure high precision and interchangeability of parts had to be made in undreamed-of quantities. A mere handful of gage manufacturers who had the "know-how" were given the job.

Monarch's assignment for 1941 was more than double any previous year's production of tool and gage maker's lathes. On November 11th, 1941, we were awarded the Navy "E" for more than fulfilling our assignment.

Precision gage making for war production is now well in hand. Soon, new precision gages for better peacetime production will be needed. The hundreds of Monarch lathes in the gage makers' plants still retain their in-built accuracy and will do as good a Peacetime job as they did a War job in the tool-rooms of America.

THE MONARCH MACHINE TOOL COMPANY • SIDNEY, OHIO



AIRCO'S *Complete Line* OF AC ELECTRODES

COVERS EVERY AC welding need



AIRCO 230
(AWS-ASTM E6011)
For highest quality all-position AC welding of mild steel.

AIRCO 81
(AWS-ASTM E6020)
For single pass, horizontal fillet welding of mild steel, manganese steel, and high tensile steels.

AIRCO 83
(AWS-ASTM E6030)
For high-speed multiple pass, flat position welding of mild steel.

AIRCO 87
(AWS-ASTM E6012)
For single or multiple pass welding of mild steel where fit-up is poor.

AIRCO 187
(AWS-ASTM E6012)
Has same general characteristics as Airco 87 but has a higher rate of deposition.

AIRCO 90
(AWS-ASTM E6013)
For general purpose welding of mild steel.

AIRCO 77
For repairing cast iron.

AIRCO 91
For resistance to shock and sliding abrasion.

AIRCO 94
(AWS-ASTM E7020)
For flat position welding of carbon-molybdenum low alloy high tensile steels.

Made in all Sizes

This complete line of Airco AC electrodes is made in a full range of sizes. For complete details on the diameters and lengths available, call or write today to your nearest Air Reduction office.

Your local Air Reduction representative will be glad to recommend the proper Airco AC electrode to meet your specific needs.

★ BUY UNITED STATES WAR BONDS ★

AIRCO WILSON

AIR REDUCTION

General Offices: 60 EAST 42nd STREET, NEW YORK 17, N. Y.

In Texas: MAGNOLIA AIRCO GAS PRODUCTS CO. • General Offices: HOUSTON, TEXAS



MY PROBLEM IS TO REMOVE CUTTING OIL

SWITCH TO LUBRICOOLANT, THE NEW TYPE LUBRICANT THAT IS COMPLETELY WATER WASHABLE . . . AND THEREFORE PRESENTS NO CLEANING PROBLEMS



Lubricoolant

THE NEW REPLACEMENT FOR CUTTING OIL

Takes the place of conventional cutting oils . . . and, at the same time, assures these improvements in cutting and grinding operations:

Increase in tool life of 30% or more . . . perfect mirror finish work . . . freedom from odor . . . holds work at heat levels not measurably above room temperature . . . transparency of solution . . . elimination of dermatitis . . . no gumminess . . . water washable, no solvents or alkalis needed.

It will pay you to investigate this new lubricant/coolant . . see why so many leading war plants are switching to Lubricoolant.

The DuBois Company

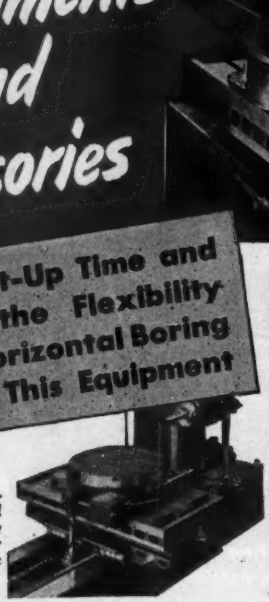
CINCINNATI 3, OHIO

Trained Service Men & Warehouse Stocks in all Principal Cities

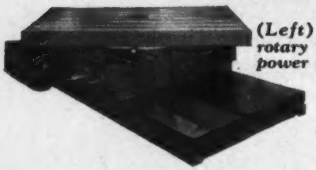
HOW and WHEN TO USE G&L Attachments and Accessories



Reduce Set-Up Time and Increase the Flexibility of Your Horizontal Boring Mill with This Equipment



(Right) Combination plain and hand feed rotary table with power take-off from table drive shaft.



(Left) Precision rotary table with power feeds.

One of the most flexible machines in your plant is the G. & L. Horizontal Boring, Drilling and Milling Machine. This flexibility and versatility can often be further increased through the use of attachments and accessories. Perhaps you can save more time through the application of one or more to your horizontal boring mill.

Rotary Tables

Rotary tables permit the machining of various surfaces without resetting the part. For instance, four or more sides of a workpiece can be machined by merely indexing the table to present the face to be machined to the machine spindle. G. & L. Rotary Tables are available from the simple, plain 24-inch diameter rotary table with ½° graduations up to the largest completely self-contained units weighing 55,000 lbs. with a rated capacity for parts weighing up to 25 tons.

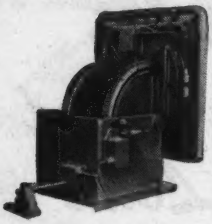




GIDDINGS & LEWIS

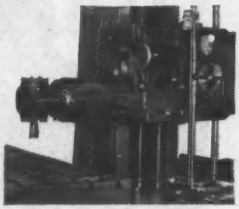
146 DOTY STREET

Universal Tilting and Rotary Tables



These units are primarily intended for use in connection with floor type machines. The table top can be rotated 360° and can also be tilted to any position from the horizontal to the vertical. Machining of angular surfaces and the boring and drilling of holes at various angles is greatly facilitated. This table is approximately 41" high and graduated in degrees and half degrees.

Angular Milling Attachments

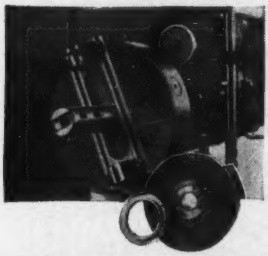


Angular Milling Attachments, like Rotary Tables, are used to minimize the number of settings of the workpiece.

They are usually furnished so that the head of the attachment is adjustable through 360° and clamped to any desired angle. In some cases, side and end milling attachments are recommended. These consist of two spindles operating at right angles to each other. Special angular attachments to suit your specific work can be designed and furnished.

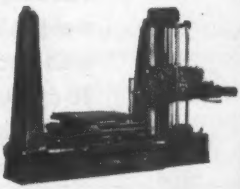
Continuous Feed Facing and Boring Head

This outstanding attachment permits facing and boring operations simultaneously and many other combinations of operations not ordinarily performed with the horizontal boring, drilling and milling machine. It is provided with a tool slide having six separate power feeds.



Combinations of Attachments and Accessories

Oftentimes, combinations of various attachments and accessories can be used to advantage in reducing set-up time and increasing production. G. & L. field engineers will be glad to work with you in making proper selections.



(Above) G.&L. 340 RT Machine with built-in rotary table.

Write for Additional Data — The books cover the complete line of G. & L. time saving machines and accessories. Write for your copy today. Please indicate your business connection. Ask for Bulletin No. [illegible]



MACHINE TOOL COMPANY

FOND DU LAC, WIS.



CP 60-CYCLE GRINDERS and SANDERS

Maintain Speed Under Load

COMPARE WITH HICYCLE GRINDERS IN EFFICIENCY AND ECONOMY

Ideal for plants whose operations do not warrant the installation of high frequency tools—or plants that have such tools but lack high frequency power lines at points where additional tools could be advantageously used. CP-460 Grinders and Sanders afford fast, uniform grinding and sanding. They have a powerful, efficient, lightweight induction motor of the same type as the well-known CP Hicycle Grinder but operate on 60-cycle, 3-phase, 220-volt A.C. This motor insures high sustained speed under load. Absence of commutators, brushes, brush holders, armatures, etc., assure lower maintenance costs. Write for complete details.

★★★★★★★★★
PNEUMATIC TOOLS
ELECTRIC TOOLS
(Hicycle...Universal)
ROCK DRILLS

CHICAGO PNEUMATIC TOOL COMPANY

General Offices: 8 East 44th Street, New York 17, N. Y.

★★★★★★★★★
AIR COMPRESSORS
VACUUM PUMPS
DIESEL ENGINES
AVIATION ACCESSORIES

What to do about Rust?

Make this Test



Immerse any rusty nail in a small quantity of Cities Service Rust Remover. If badly rusted, allow to remain for several minutes. You can actually see the rust dissolve.

See the Results



Remove nail and wipe dry with cloth or tissue. Note the complete absence of rust and the way the original surface reappears.

CITIES SERVICE RUST REMOVER has been tested for four years throughout a small, highly industrialized area in the East, where it has earned a unique reputation for performance.

RUST REMOVER is a clean, clear liquid, practically odorless, non-inflammable, easily applied, and harmless to handle by those not allergic to specific chemicals. It is fast-acting, and, although heating somewhat accelerates results, general application is recommended at normal temperature (60°-90° F.). RUST REMOVER is effective on chromium, copper, aluminum, steel and iron.

5 Big Advantages

1. Non-Inflammable
2. Harmless to Normal Skin
3. Makes Metals Chemically Clean
4. Removes Rust by Chemical Action
5. Free from Muriatic, Sulphuric, Nitric and Oxalic Acids or Cyanide.



See a Free Demonstration of Rust Remover on Your Own Equipment.

(Available only in Cities Service marketing territory EAST of the Rockies.)

MAIL THIS COUPON TODAY!

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Room 118
Sixty Wall Tower, New York 5, N. Y.

Gentlemen: I am interested in your RUST REMOVER demonstration as offered in Modern Machine Shop.

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CARTRIDGE CASE DIES with Talide Nibs made of solid Tungsten Carbide, are producing millions of brass and steel cartridge cases in sizes 20 m/m through 105 m/m, small calibre bullet cases and jackets, and primer cups with better finish, longer life, closer tolerance, and fewer rejects . . . including cupping, drawing, heading, and tapering operations. Talide Sheet-Metal Dies are also being used for deep drawing all types of metal products, including tubes, cylinders, cans and containers.

TALIDE-TIPPED BLADES for centerless grinding screw machine products, multiple diameter shafts and spindles, and parts having special shapes or contours. Send for catalog No. 43-WP.

TALIDE-TIPPED TOOLS for all types of turning, boring and facing operations on steels, cast iron and non-ferrous metals and non-metallic materials. . . . Send for catalog No 43-T.



TIPPED WITH TALIDE TUNGSTEN CARBIDE

METAL CARBIDES CORPORATION YOUNGSTOWN, OHIO

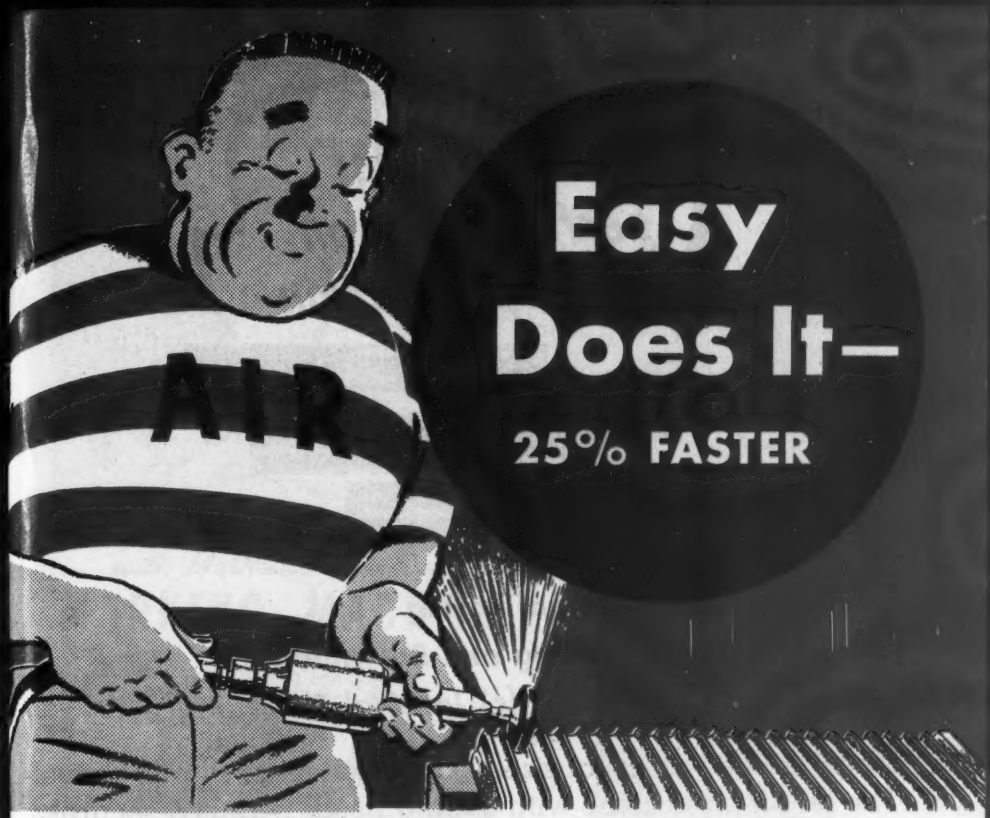


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TUNGSTEN CARBIDE TOOLS · DIES · WEAR PARTS



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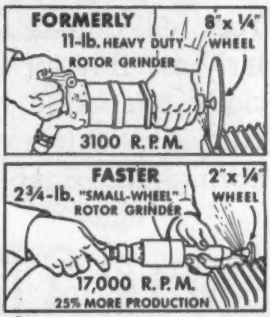
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ALONG came these heat exchanger castings with grooves to be ground by ¼" thick wheels. The foundry had only 11-lb., 3100 R.P.M. grinders with 8" x ¼" wheels. They worked . . . but, were they *the right tools for the job?*

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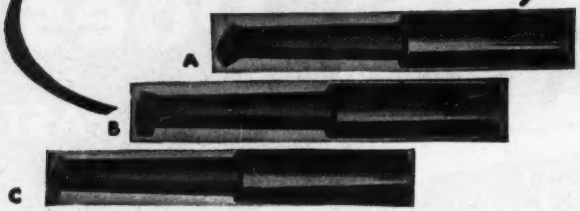
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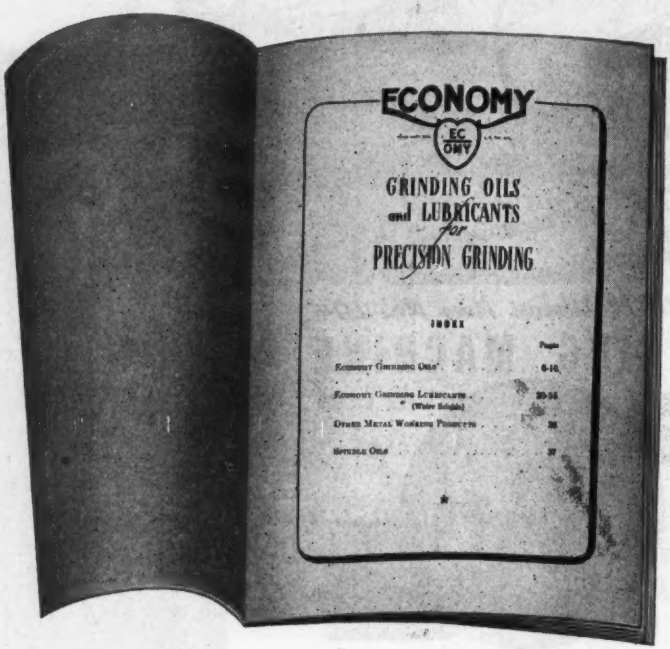
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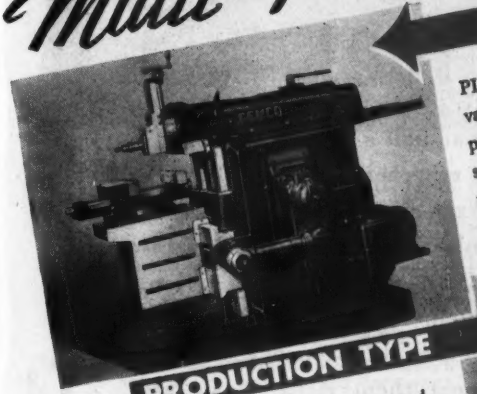
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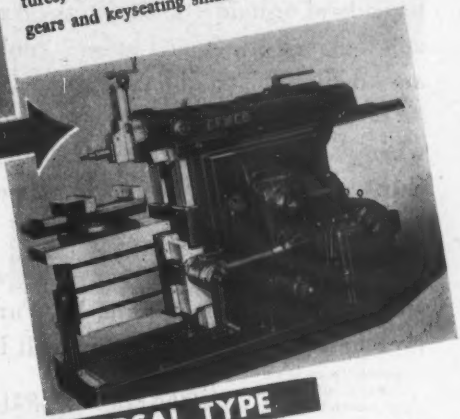
Multi-Purpose SHAPERS

PLAIN TYPE



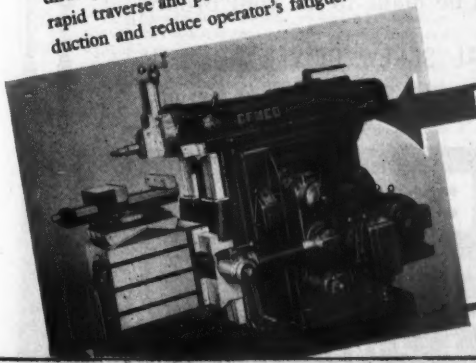
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PRODUCTION TYPE — Massively constructed with a large table to handle medium heavy work. Large cumbersome pieces may be easily clamped directly to the apron by removing the table. Power rapid traverse and power down feed accelerate production and reduce operator's fatigue.

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UNIVERSAL TYPE — Ideal for tool and die work, experimental laboratories and model shops or where angular work set-ups are required. Particularly adaptable for shaping wedges, gibs, internal openings, complicated fixtures, molding dies, etc.

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Established 1880



MIDWEST MILLING CUTTERS

AND HOW BEST TO USE THEM

HEAVY DUTY PLAIN MILLING CUTTERS—This type of cutter is recommended where there is heavy production milling of materials in soft or alloy steel, bronze or copper. They have coarse pitch, undercut teeth with maximum backing behind cutting edges and ample chip space.



Midwest standard heavy duty mills have a smooth cutting action; they set up an end thrust which keeps the spindle tight in its bearings and eliminates chatter because they are made with 45° left-hand spiral teeth.



HALF SIDE MILLING CUTTERS—a type for heavy-duty straddle milling operations where only one side of the cutter is required for milling; also used frequently in pairs to mill a slot to fixed width but where finish at bottom is not important.

These mills have spiral, undercut teeth which provide particularly free-cutting action. Compared with side milling cutters, these half side mills show lower power consumption, more pieces per grind, and less idle machine time due to cutter changes.

STAGGERED TOOTH SIDE MILLING CUTTERS—This type of mill is exceptionally free cutting. For that reason it is ideal for deep slotting or the milling of keyways. The top teeth are undercut and have an alternate right and left-hand helix angle, which greatly reduces end thrust.



Since drag ends (inefficient tooth portions) are eliminated, increased chip room is obtained, and chip lengths are broken up, giving them the characteristic snap out of the cut. The sides of the teeth having no cutting action are "dished" slightly toward the recessed part of the cutter and this eliminates "bugging" of the cutter sides and, in turn, scoring the sides of the slot.



Many other types and forms of metal cutting tools are made by Midwest; catalog No. 17 contains illustrations and extensive information on them.

Any metal cutting problem inquiry you make will be carefully studied and analyzed. Suggestions and recommendations will be returned to you on types of tools to employ and how best to use them—a Midwest service entering its 31st year.

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2366 W. Jefferson Ave. Detroit, Mich.

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TOOL SYSTEM

Single Point Tools

FOR LATHES
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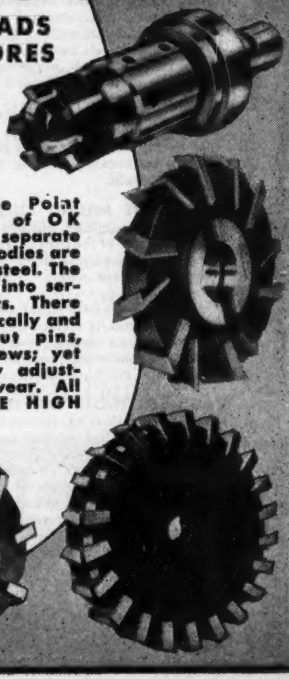
These tools embody various locking designs. In some, the bits are held in mated serrations; in others, round-shank bits are locked in a drop seat. In others, the locks are different still. The bodies, or holders, are made of drop-forged alloy steel and the bits may be had in high speed steel or tungsten carbide tipped.

There's an O K Tool for every metal-cutting need, with a wide assortment of bits and blades. Today the O K System is doing an outstanding job in the production of precision war products. Tomorrow it will resume its important place in the peace time production lines of the country. Look into it now — with "tomorrow" in mind!



MILLING CUTTERS

BORING HEADS
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FACE MILLS
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As in the Single Point Tools, the blades of O K Milling Cutters are separate cutting units, the bodies are drop-forged alloy steel. The blades are driven into serrated mating slots. There they lock automatically and positively without pins, wedges or set-screws; yet they are instantly adjustable in line of wear. All O K Tools SAVE HIGH SPEED STEEL!

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Originators of the Inserted-Blade Principle



TWO WAYS TO FIND OUT

why BRIGHTBOY gives you FINER FASTER

DEBURRING • FINISHING • POLISHING

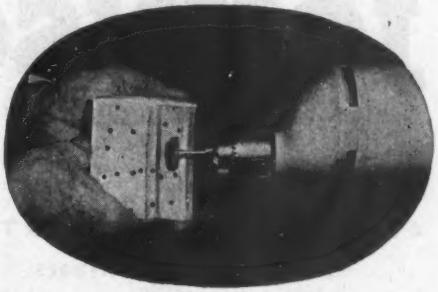
LOOK at Brightboy through a microscope. You'll see abrasive impregnated *clear through* a piece of resilient rubber. You'll understand the new yet proved principle of "rubber cushioning" in which the abrasive *recedes* slightly into the rubber when work is in process. Both rubber and abrasive *combine* in an all-in-one de-burring, finishing and polishing action.

Try Brightboy under actual working conditions. Prove that it saves operations and time — bridges the gap between a grind and a buff. With Brightboy wheels, the degree of finish or polish is obtained by regulating the machine speed; with Brightboy hand tablets for manual work, by hand pressure.

BRIGHTBOY METHODS AND APPLICATIONS are described in detail in an attractive booklet which may be obtained, together with prices, from your distributor or from us. Brightboy field representatives are at your service. INVESTIGATE BRIGHTBOY NOW!

Outstanding Work Advantages of Brightboy for All-in-One DE-BURRING, FINISHING, POLISHING

- Bridges the gap between a grind and a buff.
- Does not load, gum or fill.
- Works with minimum dimensional loss.
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- Made in wheels, blocks, sticks, rods— for manual and machine operations.

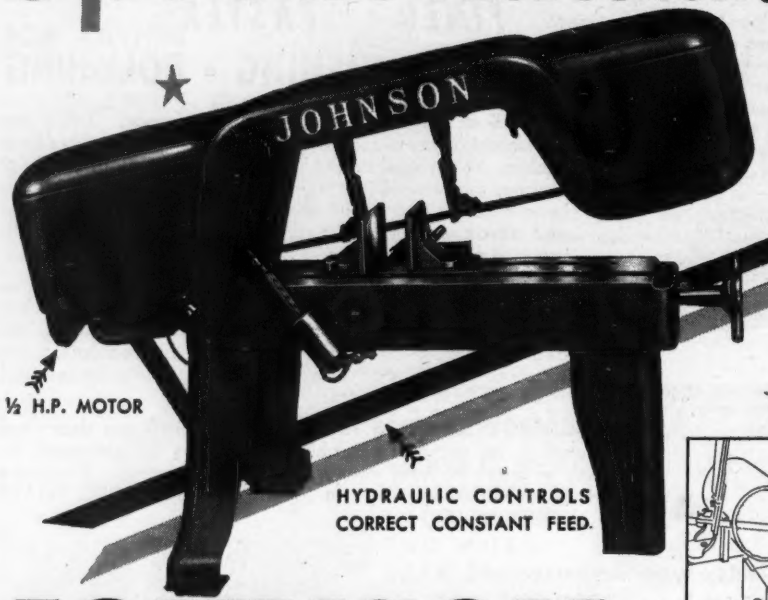


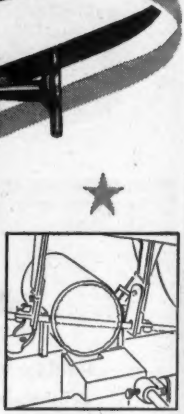
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Meehanite Metal is of fine close grain, uniform texture, unusual strength and solidity . . . metallurgical qualities that make high precision surface plates. These are one-third heavier than any other quality plates, and the weight is scientifically distributed by the honeycomb base. The surfaces are handscraped to extremely close tolerances.



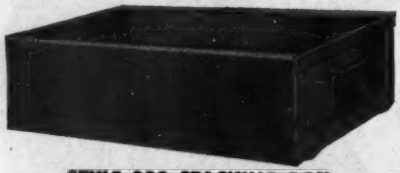
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3½x4	5 Lbs.	2½"	.0001"	$ 12.50
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10x10	43 "	3½"	.0001"	35.00
12x12	50 "	3½"	.0001"	43.00
12x18	85 "	4"	.0001"	68.00
14x18	100 "	4"	.0001"	75.50
16x16	100 "	4"	.0001"	75.00
18x18	140 "	4½"	.0001"	98.00
18x24	200 "	5"	.0001"	133.00
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20x20	160 "	4½"	.0001"	123.50
20x30	325 "	5¼"	.00025"	190.50
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24x36	475 "	7"	.00025"	275.00
30x36	510 "	7"	.00025"	345.00
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31x78	2100 "	10"	.0003"	827.00
48x72	3600 "	11"	.0003"	1054.00
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8x42	238 Lbs.	6"	.0001"	98.00
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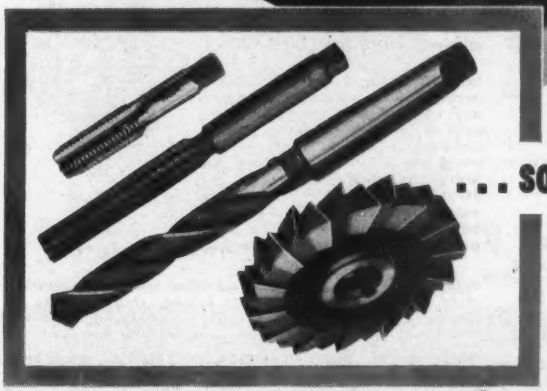
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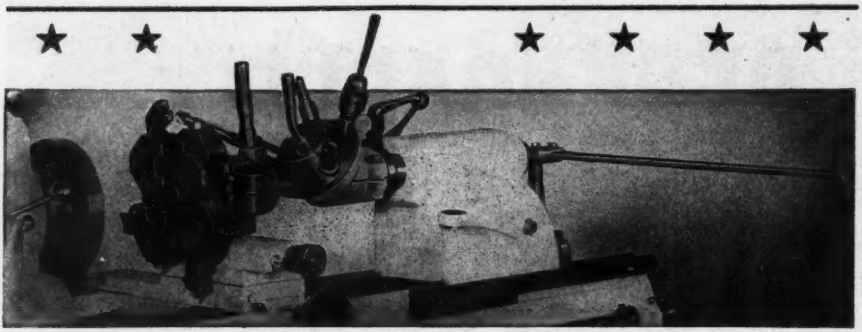
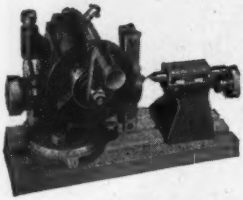


Photo above shows Jefferson Turrets on 16" lathe



7½" Swivel Base Dividing Head—Immediate Delivery

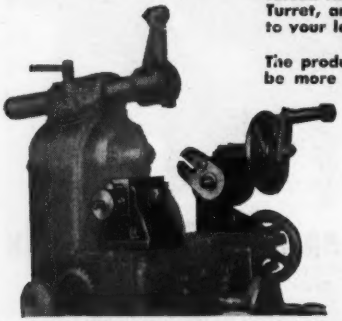
Convert YOUR ENGINE LATHE INTO A TURRET LATHE IN 15 SECONDS



5-Tool Tail-Stock Turret

PAT. PENDING

Yes, it's as easy as that! You simply attach the Jefferson Tail-Stock Turret, the Jefferson Tool-Post Turret, and the Jefferson Adjustable Pull Feed to your lathes as shown in illustration.



6" Tilting Dividing Head with 3 Indexing Plates and Tailstock—Immediate Delivery.

The productive capacity of these machines will be more than doubled in many instances because there will be available at all times NINE DIFFERENT TOOLS.

With these three JEFFERSON time-saving devices attached to a lathe, any kind of work may be done, such as forming, roughing, boring, finishing, knurling, drilling, tapping, etc., without stopping the lathe, or changing tools. THE JEFFERSON TURRETS are made very substantial, rigid, accurate and in several sizes to fit small bench lathes up to 24" swing.



4-Tool Tool-Post Turret

Jefferson Turrets are real production tools—substantial, rigid, accurate and adaptable to any size or make of engine lathes. They must not be confused with the small makeshift gadgets now on the market.

Some territories still open for dealers and salesmen.

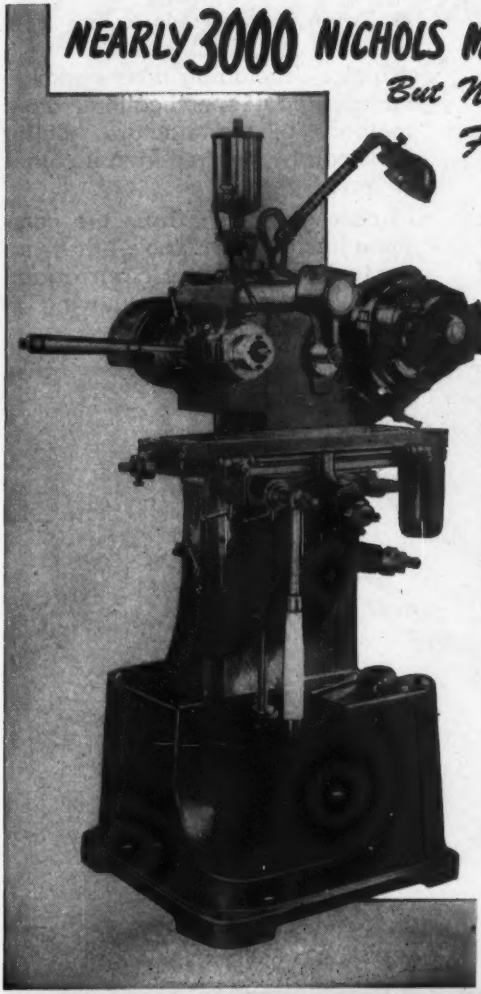
TURRET DELIVERIES IN 6 DAYS

JEFFERSON MACHINE TOOL CO.
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Tool-Post Turrets, Tail-Stock Turrets, Adjustable Pull Feeds, Belt Sanders, Gyratory Foundry Riddles, Overhead Swing Frame Grinders, Milling Machines, Dividing Heads and Vises.

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Low Cost

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Spindle Rise and Fall—4½"

Standard Speeds to 2400 rpm
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Immediate Delivery

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MOLYBDENUM-TUNGSTEN HIGH SPEED STEEL



The war-born shortages in certain materials, which restricted the total possible output of MO-MAX, have been overcome. No longer need you be hampered by inability to obtain adequate supplies of MO-MAX. Today MO-MAX, after ten years of successful use, has a record of tested and known performance.

For quality and quantity production, STANDARDIZE on thoroughly established MO-MAX, the steel that revolutionized the high speed steel business. It is available from reliable sources. Ask your nearest regular steel supplier for MO-MAX. If it is not in stock, communicate with any of the tool steel producers listed below. Their brand names shown on this page are all MO-MAX molybdenum tungsten high speed steel.

For technical data booklet, write any mill named or The Cleveland Twist Drill Co., Cleveland, Ohio.

Formula for General Purpose MO-MAX

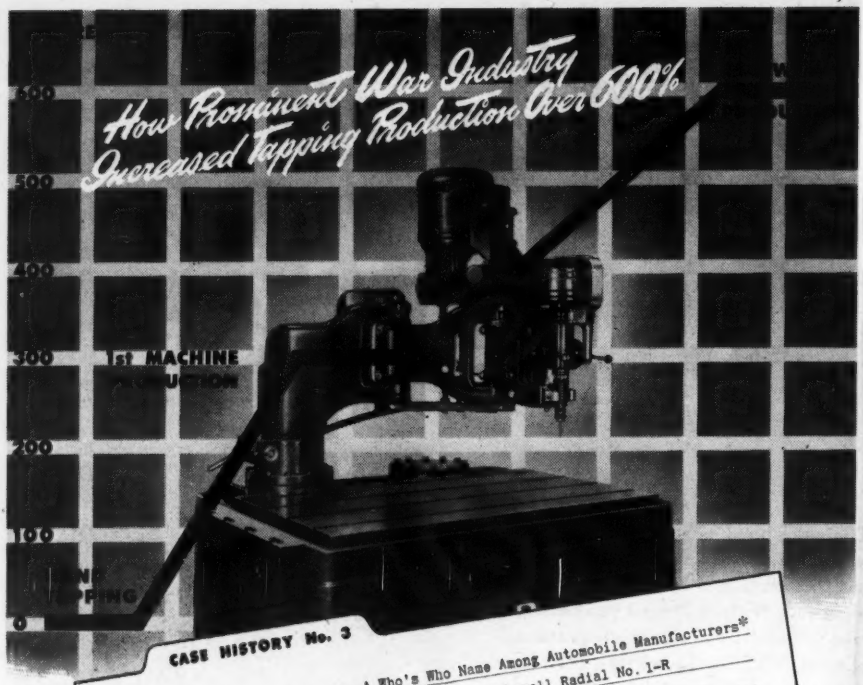
Carbon	.80
Molybdenum	8.50
TUNGSTEN	1.50
Chromium	4.00
Vanadium	1.00

Standard with fourteen of the leading steel mills

THEY'RE ALL MO-MAX

"LMW"	Allegany Ludlum Steel Co.	"Moltie 8"	Columbia Tool Steel Company	"Talmo"	Latrobe Electric Steel Co.
"Mohican"	Atlas Steels, Ltd.	"Rex T-Mo"	Crucible Steel Co. of America	"S.T.M."	Simonds Saw and Steel Co.
"Bethlehem HM"	Bethlehem Steel Company	"Di-Mol"	Henry Disston & Sons, Inc.	"Mo-Tung"	Universal Cyclops Steel Corp.
"Mo-Cut"	Braeburn Alloy Steel Corp.	"Rex T-Mo"	Halcomb Steel Co.	"Vul-Mo"	Vulcan Crucible Steel Co.
"Star Max"	Carpenter Steel Co.	"Maxal"	Jessop Steel Company		

How Prominent War Industry Increased Tapping Production Over 600%



CASE HISTORY No. 3

The third of a series of actual case histories showing how war industries boost their production and save critical tools and materials with Bakewell Precision Tapping Machines . . . . . .

FIRM: A Who's Who Name Among Automobile Manufacturers*
TAPPING MACHINE: Bakewell Radial No. 1-R
PIECE TAPPED: Reduction Gear Case
MATERIAL: Aluminum
SIZE OF TAP: 5/16-18
NO. HOLES TAPPED PER HOUR: See Remarks
PERCENTAGE OF REJECTS BEFORE USING BAKEWELL: 6
PERCENTAGE OF REJECTS WITH BAKEWELL: 2

REMARKS: When the job was first set up, we tapped the holes by hand, but later changed to a ---------tapping machine. We now tap these 5/16-18 holes on the Bakewell with the following results: the Bakewell is 6 times as fast as the hand method and 30% to 100% faster than the first machine used. It may also be noted that with the Bakewell no bushing is required to guide the tap. A special indexing feature is used. The cutting oil is Socony Vacuum's Thread Grinding Oil #269. In sizes up to 3/8" 2-fluted taps operate most efficiently.



BAKEWELL
Manufacturing Co.
2009 SANTA FE AVE., 21 • LOS ANGELES, CALIF.

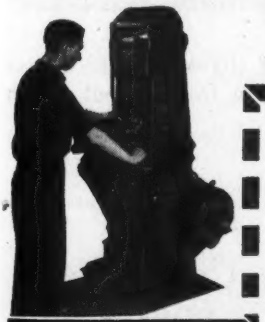
** Name of firm furnished upon request. Write for FREE General Specification Booklet describing all Bakewell models.*

Learn What WET BELT SURFACING Can Do For YOU...



More and more applications are being found every day for this advanced machining method that works an entire area at once, that produces final finish while taking the cut, that eliminates heat, dust, distortion, discoloring, fracturing. Wet-Belt surfacing is amazingly fast—5 to 25 times faster than previous methods. It is simpler—often eliminates need for jigs, as well as set-up and lock-up time. It is so accurate that tolerances of .0005" can be held when desired. It enables inexperienced workers to get increased production and superior finish. It can handle many operations now performed on grinders, millers, shapers, planers. It supplements other machines to step up production, reduce costs, and improve results.

The Porter-Cable Wet-Belt Surfacer has been a revelation in many shops. Learn more about it. Send for our new booklet, which is virtually a text-book on the subject. Fill in and mail the coupon right away.



PORTER-CABLE MACHINE COMPANY

PORTER-CABLE MACHINE CO.,
300-1 Wolf Street, Syracuse, N. Y.

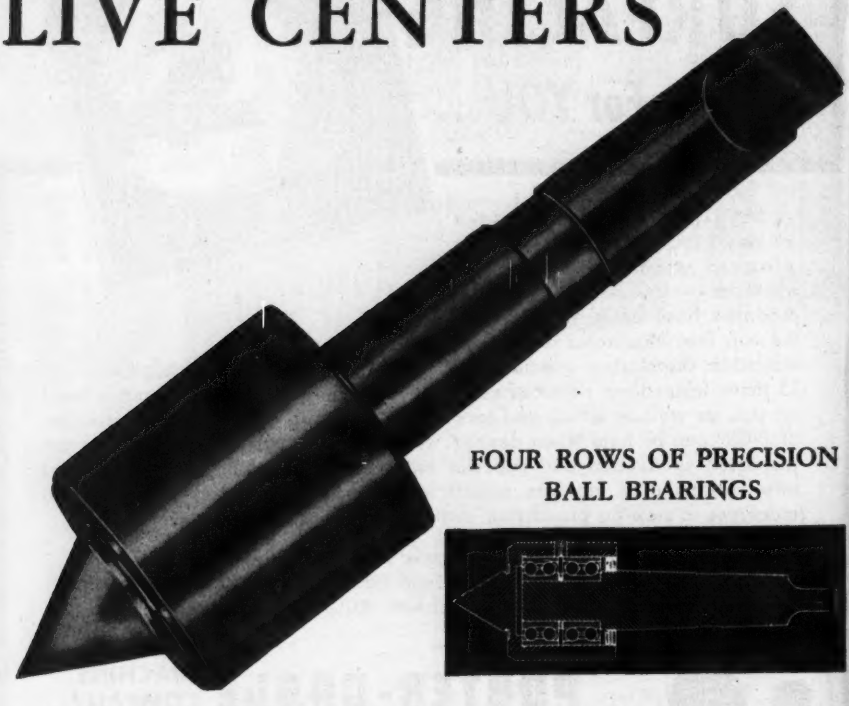
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Precision
LIVE CENTERS



FOUR ROWS OF PRECISION
BALL BEARINGS

QUADRO LIVE CENTERS combine the rigidity of the solid lathe center with the frictionless properties of the ball bearing to form a tool which will increase production without sacrificing accuracy.

Manufactured in all tapers and sizes.

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DAKON Tool & Machine Co., Inc.

838 BROADWAY • NEW YORK 3, N. Y.



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ALL OF WHICH CAN BE DELIVERED WITHIN

48 HOURS

End mills that you need immediately are in stock—ready for shipment to you from the Putnam Tool plant or from the headquarters of a number of the Putnam sales representatives. In addition, complete stocks are now built up on end mill holders, continuous pilot counterbores and spiral fluted chucking reamers.

The items available include not only all popular sizes and types but many which, from any other source, would be considered special tools. To facilitate your production schedules . . . to get the maximum in tool economy . . . it's to your advantage to think of Putnam tools *first!*

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High Speed End Mills • Continuous Pilot Counterbores • Spiral Fluted Chucking Reamers

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Yes, all of us . . . you and we . . . let's make 1944 a record-breaker! Better production, less absenteeism, fewer wrangles . . . these will bring the boys back in a hurry. Let's get 'em home!

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A complete line for every coolant purpose. Special models if needed.

Pipe sizes 3/8" to 1 1/2".



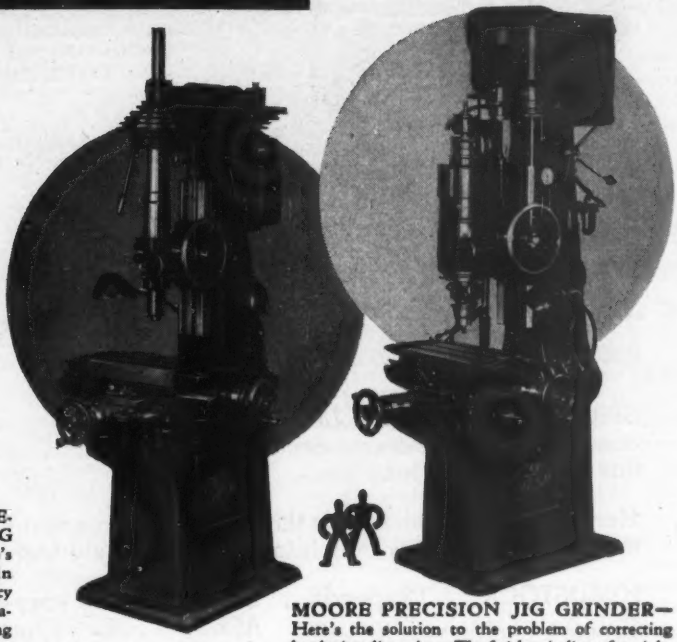
MODEL AG3M—Motor driven. Hardened steel sleeve shaft slips over motor shaft.

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THE FULFLO Specialties Co., Inc.
BLANCHESTER, OHIO

Ground Bored by MOORE

"Partners in Production"



MOORE PRECISION JIG BORER—Here's the last word in accuracy, efficiency and ease of operation for the boring of holes in jigs, fixtures, dies, gauges and special, accurate machine parts. The Moore Jig Borer is highly sensitive for holes of 1/32″ diameter or less and yet rugged for heavy cuts up to 4½″. Operators can accurately spot, drill, ream and bore in one uninterrupted sequence with the Moore Jig Borer.

MOORE PRECISION JIG GRINDER—Here's the solution to the problem of correcting hardening distortions. The finish-grinding of straight and tapered holes to size and location is now possible in one-quarter the time formerly required—and with greater accuracy and fewer mistakes. The Moore Jig Grinder has a capacity to grind holes from .030″ to 4″, accuracy of screws of .00005″ per inch and grinding speeds of 25,000 to 45,000 RPM.

☆ ☆ ☆ MODERNIZE YOUR TOOLROOM OPERATIONS

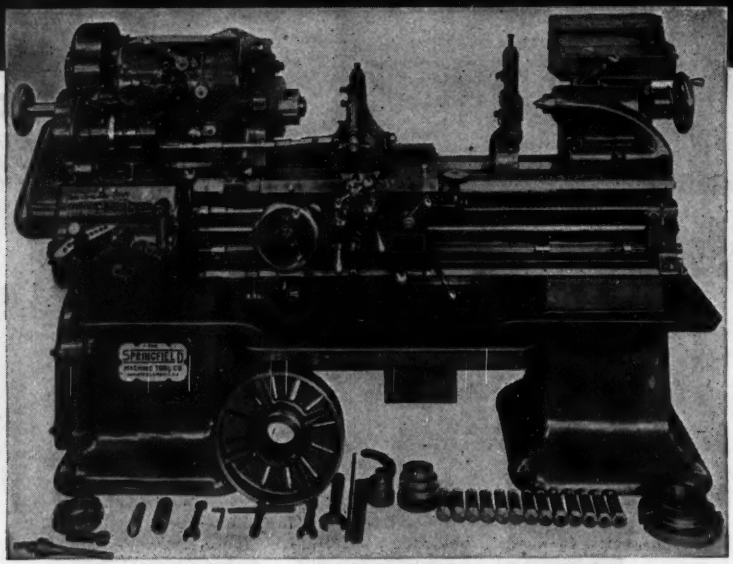
with these companion machine tools. Moore-produced lead screws, ground to an accuracy never achieved before, give the coordinate location method—features of both Moore tools—definite advantages over the graduated scale and size block methods of measurement.

Ask today for full details on the Moore Jig Borer and Jig Grinder.

MOORE SPECIAL TOOL COMPANY INC.

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PRECISION and LONG LIFE



SPRINGFIELD Precision LATHES fill the munitions makers' demands for (1) extreme accuracy and (2) maintenance of this accuracy and long life.

Here are some of the factors that account for the sustaining of the original accuracy built into each Springfield Lathe:

HEADSTOCK . . . 12 speeds . . . only half of the easy-shifting spur gears mesh at one time. APRON . . . extra heavy . . . operates on ball and bronze bearings throughout. TAILSTOCK . . . all bearings and bed ways oiled from one well.

The SPRINGFIELD LATHE is an outstanding value for both tool room and quantity production use. *Write for Bulletin 162.*

THE SPRINGFIELD MACHINE TOOL CO.

SPRINGFIELD OHIO

How to Reduce Costs on CHUCKING WORK



Turning pre-formed parts the "long way" is too slow and too costly. To meet modern mass production conditions, National Acme now offers to industry a new line of 4, 6 and 8-Spindle Chuckers.

These new machines operate with the same high speeds, the same precision, and have the same broad adaptability that have made Acme-Gridley multiple spindle bar automatics such important war production tools.

New! **ACME-GRIDLEY 4, 6 and 8-SPINDLE STANDARD UNIVERSAL CHUCKER with Adjustable Hydraulic Control**

The new machines have extreme flexibility of tooling and adaptability to a wide variety of work. Their accuracy meets the latest war-born standards. They have the precision that comes only from proper weight distribution, rigidity and balance, with freedom from vibration.

Our Engineering Department will gladly consult with you to select the proper type and size to handle your work. Orders are now being booked for near-future delivery. New Catalog CM-43 gives complete details.

★ ★ ★

New Acme-Gridley Chuckers are engineered for new production and accuracy records—to produce more at lower costs.

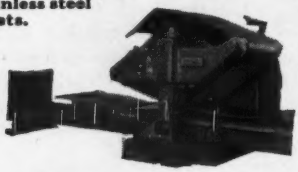
THE NATIONAL ACME CO.

170 EAST 131ST STREET • CLEVELAND, OHIO

ACME-GRIDLEY 4-6 AND 8 SPINDLE BAR AND CHUCKING AUTOMATICS • SINGLE SPINDLE AUTOMATICS • AUTOMATIC THREADING DIES AND TAPS • THE CHRONOLOG • LIMIT AND CONTROL STATION SWITCHES • SOLENOIDS • CENTRIFUGES • CONTRACT MANUFACTURING

MATTISON
ABRASIVE BELT GRINDING AND POLISHING MACHINES

Mattison W-455 Wide Belt Grinding and Polishing Machine for finishing of wide stainless steel sheets.





Mattison J-135 Idler Stand and Pulley adapts regular polishing Jack to the use of factory-coated abrasive belts.

★ Results obtained in a number of plants definitely establish the use of factory coated abrasive belts as a most efficient practice. Besides reducing the number of rejections and improving the finish, they have cut the polishing cost per piece through increased production.

However, to secure full benefit from factory-coated abrasive belts, the right type of mechanical unit is necessary. The machine is all important for properly applying the abrasive to the particular job to be done.

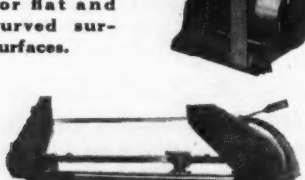
Mattison Abrasive Belt Grinding and Polishing Machines are engineered with a knowledge of the factors involved to give the best application of belts. From the time factory-coated abrasive belts were introduced for metal grinding and polishing, Mattison's have developed and built machines to provide best results.

Mattison Abrasive Belt Grinding and Polishing Machines are used for smoothing up welding marks, polishing solid parts—such as handwheels, levers, handles, steel sheets including stainless steel—and the inside of tubes. They are built for both the wet and dry grinding method. In addition to the finishing of metal parts, they are used for plastics, hardened rubber, fibre, glass, etc. In fact, the applications are so numerous, only a few can be mentioned onand shown on this page.

Whatever your problems may be, it is well worth while to make an investigation as to the machine available for handling it.

Mattison J-115 Variety Belt Grinding and Polishing Machine for flat and curved surfaces.

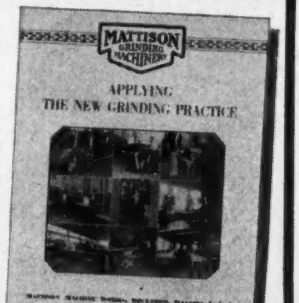




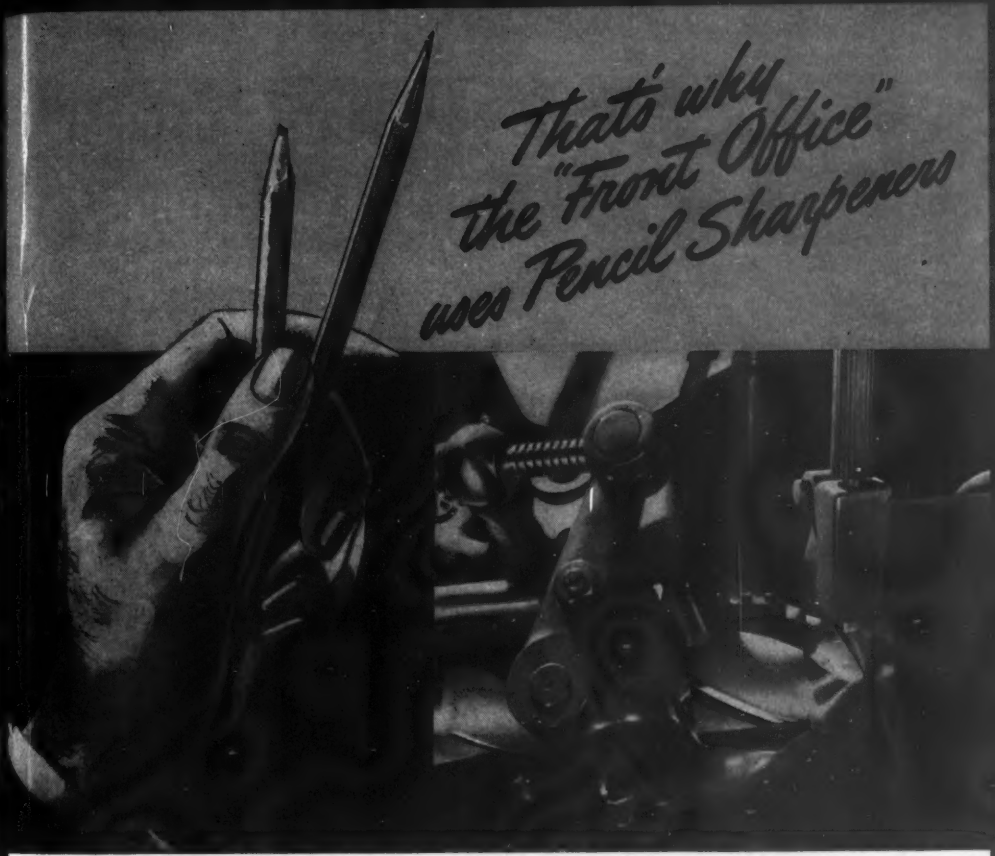
Mattison L-138 Grinding and Polishing Machine arranged for wet grinding.

SEND FOR *FREE* BOOKLET

Illustrates various applications of Mattison Grinding and Polishing Machines, built to to secure best results from factory coated abrasive. belts. Also gives helpful data on grinding and pol ishing metals, plastics and other materials with abrasive belts. Write today for your copy.



MATTISON MACHINE WORKS—ROCKFORD, ILLINOIS



It's a quicker, more accurate, less wasteful way of doing the job. And for those same good reasons *modern* tool rooms are equipped with

The SELLERS DRILL GRINDER

This method of grinding automatically produces the scientifically correct drill point required for precision work. Angles of inclination are equal, contour of lips is identical, resulting in a point that drills true cylindrical holes faster with more holes per grind.

Inexperienced girls are quickly trained to turn out a constant supply of perfect drill points, reducing both your drill inventory and drilling costs.

For proof of why it will pay you to equip your tool room with this modern machine, send us three drills of any size up to 3 ins. and we will return them ground with the Sellers point. No charge, no obligation. Wm. Sellers & Company, 1614 Hamilton St., Philadelphia.

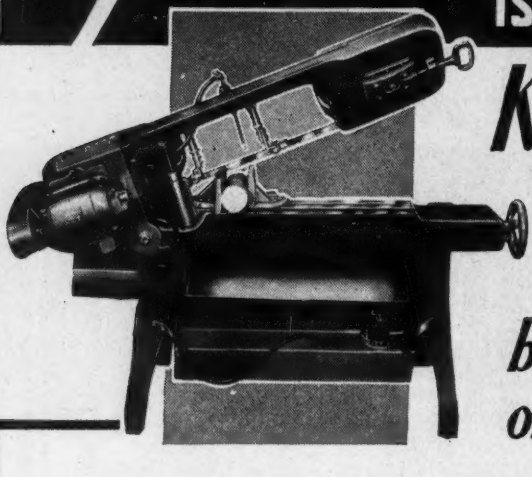


SELLERS DRILL GRINDERS

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SELLERS PRECISIONEERING SINCE 1848

Faster—as Cutting Action is Continuous!



Kalamazoo Metal Cutting BAND SAW brings Savings on Cut-off work

Why use a large expensive cut-off machine when a small low cost machine does the work faster and more accurately?

PAYS FOR ITSELF in a relatively short period due to—reduced labor cost—smaller first cost—lower maintenance, depreciation and power costs.

Portable—wheel it right to the work—plugs in anywhere. Cuts solids, tubes or irregular shapes.

STANDARD MODEL for dry cutting.

COOLANT MODEL for production cutting.

COOLANT attachment is compact—does not interfere with portability or machine operation—lengthens life of saws and triples production.

Plan now for after-the-war efficiency. Saving in thousands of modern plants. WRITE FOR BULLETIN.

MACHINE TOOL DIVISION

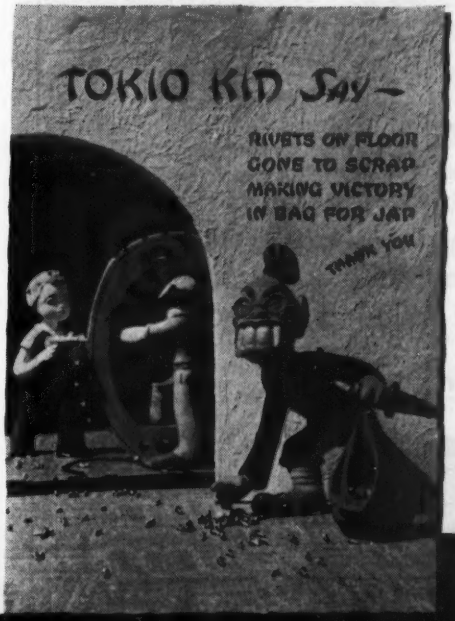
KALAMAZOO TANK & SILO CO.
KALAMAZOO, MICHIGAN



Ready for Quick Delivery!

NEW, IMPROVED

CLECO RIV-N-JECTORS



They reduce rivet dropping 90% or more. The Cleco RIV-N-JECTOR is a feather-light device comprising a magazine which holds 50-odd rivets—depending on length—combined with a mechanism by which rivets may be inserted in the hole and released, another rivet at the same instant being moved into position for inserting in the next hole. RIV-N-JECTORS are loaded by use of the electrically operated hopper illustrated.

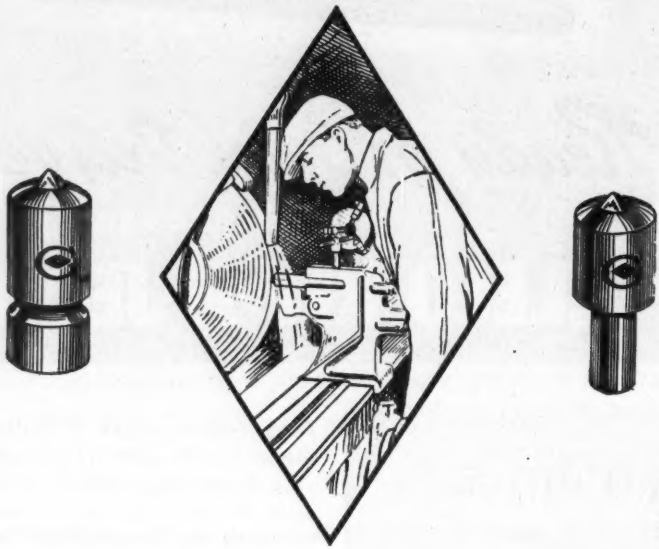
RIV-N-JECTORS are made in three sizes No. 1 for 1/16" and 3/32" rivets; No. 2 for 1/8" and some types of 3/32"; No. 3 for 5/32" rivets. All RIV-N-JECTORS carry lettered panels to show size, and are further identified by color bands corresponding to colors used for Cleco Sheetholders.

The whole story of RIV-N-JECTORS and loading hoppers is told in new Bulletin 89, sent upon request. Demonstration at your convenience—entirely without obligation, of course.

THE CLEVELAND PNEUMATIC TOOL CO.

EXPERIENCED OPERATORS FOR MANY YEARS
HAVE PREFERRED

GILMORE DIAMOND TOOLS



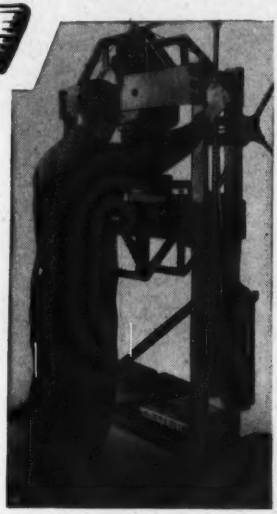
From Needlepointed Diamonds for delicate shaping of thread grinding wheels, up to husky diamonds that can take care of heavy centerless-grinder wheels, these tools stand the test for economy and satisfaction.

Circulars on request.

F. F. GILMORE & CO.

285 Columbus Ave. **Boston (16), Mass.**

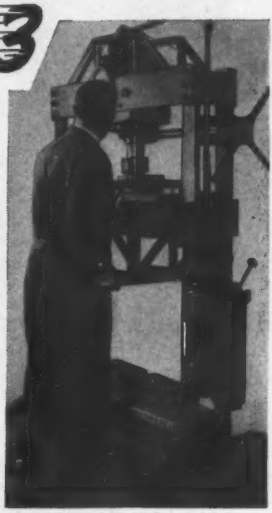
SPEED



SPIN THE HANDWHEEL and the ram speeds to the work by fast mechanical action instead of slow, laborious hydraulic pumping.



FLIP THE BALL ARM to close the valve instead of slowly turning a handwheel type control.



START PUMPING and immediately get tons of pressure on the work because the hydraulic cylinder was automatically filled with oil during oper. No. 1.

3 QUICK MOTIONS OPERATE KRW HYDRAULIC PRESSES!

SPEED is the basic design feature of KRW Hydraulic Arbor Presses—*they are faster than most power-operated presses.* In operation, you get *speed* in bringing the ram to the work . . . *speed* in developing hydraulic pressure . . . *speed* in raising the ram to remove the work. These KRW features have sold thousands of our hydraulic presses to industry where they are doing work formerly considered only possible on larger, heavier and more costly equipment. Ingenious adaptations of KRW presses have been built to handle many kinds, sizes and types of material. All, of course, incorporate the KRW principle of SPEED in operation. Write for our new bulletin describing KRW Hydraulic Presses in 25, 50, 60 and 75-ton capacities.

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FOR FINER
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Use OREMEL MOTO-TOOLS
Model 2 Moto-Tool, complete with accessories, as illustrated, in felt-lined hardwood case—$23.50. Model 2 Moto-Tool only, with emery wheel point — $16.50.
27,000 R.P.M.
Used in machine shops and tool rooms for finishing intricate dies. Used on production lines to clean castings, turnings and forgings; sharpen tools and do hundreds of grinding, finishing, polishing, burring, routing and etching operations.
Dremel Moto-Tool has AC-DC motor with shock-proof bakelite housing, silvered (oilless) bearings, and built-in cooling fan. Weighs only 13 ounces—so light and compact a girl can handle it with ease. Dynamically balanced armature eliminates vibration and provides precision control. Moto-Tool's high speed (27,000 rpm) permits fast, fuzzless and chipless cutting.
Dremel Moto-Tools are proving indispensable aids in speeding up war production in such plants as General Electric, Westinghouse, Remington Arms, Ford, Nash-Kelvinator, Consolidated Aircraft, Douglas and Martin Aircraft, and many similar "Arsenals of Democracy."
10 DAY TRIAL
Try a Dremel Moto-Tool on your own jobs—in your own shop. See how versatile, how indispensable it is—how it saves time and materials. Order from your distributor. If he cannot supply you—write factory. PROMPT SHIPMENT on orders with proper priority.
Whether you have a Moto-Tool or any other type of grinder, use only genuine Dremel shock-tested Abrasives — steel cutters.
DREMEL MFG. CO. T-224-A RACINE, WIS. U.S.A.

LIBERTY
HIGH
SPEED
ATTACHMENTS
for
Surface
Grinders



For Surface Grinders

Nothing but praise when you use Liberty High Speed Grinding Attachments for cutting these "difficult to get at" jobs.

Their spindles are preloaded by an ingenious spring arrangement that guarantees perfect static and dynamic balance, and may be had with solid quill or collet chuck.

Grinding to close tolerances in blind end slot.

Liberty Vertical attachment illustrated here, and the Liberty Horizontal Attachment are precision tooled for greatest accuracy, and may be assembled to your grinder in 2 minutes without machining.

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LIBERTY TOOL & GAGE WORKS INC.

237 Georgia Ave. **Providence, R. I.**

Tomorrow's Tools for Today's Tasks

TOOLS LEAD A DOUBLE LIFE

SUNICUT

increases tool life 100%... improves finish of parts

Tools can't take a holiday . . . not when there are guns to make, and bombers to build, and other war material to produce. But tools were taking holidays . . . far too many . . . for regrinding and resharpening at one of the largest mid-west war plants.

Production quotas were a headache to machine tool operators and foremen because the frequent "time-outs" for tool changes cut down the output. In addition the finish of the parts was not up to par. Many grades and brands of cutting oil were tested and tried, but all failed to correct the condition. So they called a Sun Doctor of Industry — a cutting oil expert — who studied the problem and recommended a change to Sunicut, the transparent, sulphurized oil.

Tools double parts produced for tool grind on many operations before they need changing . . . and the finish of the parts is everything that could be desired. Sunicut succeeded where the others failed.

Output is stepped up in this war plant because the high heat-absorbing and metal wetting properties of Sunicut permitted longer tool life and finer finish. How about investigating the production-boosting possibilities of Sunicut in your plant? A Sun Oil Engineer will be glad to discuss it with you. Write

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SUNOCO

SUN INDUSTRIAL PRODUCTS *HELPING INDUSTRY HELP AMERICA*

CUT *MAN HOURS* TO *MAN MINUTES* ON SHORT RUN PIERCING WORK



WIEDEMANN TURRET PUNCH PRESSES

ONE USER REPORTS . . .

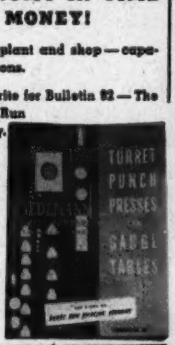
"We solved *the problem of punching the great variety of holes required by installing a battery of Wiedemann turret presses. The relatively small runs do not justify making complete dies, and the large dimensions of many of the pieces would require enormous presses.*

"We save both time and tool costs by using turret presses. Experience shows a tremendous saving from the use of these presses in runs up to 800 or 1000 as well as in making one or two pieces for experimental work."

TRUE ECONOMY IN TIME AND MONEY!

A type for every plant and shop — capacities from 8 to 80 tons.

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Sav-Way MASTER SETTING AND CHECKING ROLLS



For Accurate Tool Checking

Your precision tools and inspection devices are only as accurate as the methods and gages by which they are set and checked. In many cases, flat gage blocks are not adequate. This Sav-Way Set of Master Setting and Checking Rolls provides for the first time a really accurate means of checking micrometers, snap gages, amplifiers, and dial indicators. You'll be surprised at the low cost.

Set consists of twenty rolls ranging from .100" to 2.000" in diameter. Hardened, ground, and lapped to X gage tolerance. Housed in modern transparent plastic case.

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Sav-Way Industries, Box 117, Harper Station, Detroit 13, Michigan, U. S. A.

Please send circular describing Sav-Way Master Setting and Checking Rolls.

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call it "KNOW HOW"...

There are many names for skill and experience but no substitute for the combination. Through 15 years of peacetime production, Allied Products Corporation perfected the skill of its craftsmen and the facilities of its four great plants. Now our many skills are turned to producing the tools and dies and parts needed for war. We are proud that each of our four plants flies the Army-Navy "E" for excellence of production.

ALLIED PRODUCTS CORPORATION

Detroit and Hillsdale, Michigan

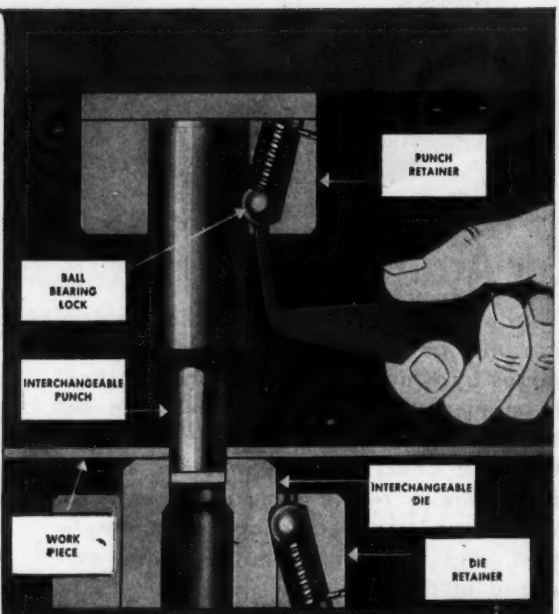
Precision Aircraft Parts . . . Plastic Molds . . . Interchangeable Punches and Dies . . . Production Parts
Sheet Metal Dies . . . Jigs and Fixtures . . . Cold Forged Parts

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The Original Interchangeable Punch and Die

Perfected by Richard Brothers Division of Allied Products Corporation, this unit is now widely used in all metal working fields. Standard size square, round or end retainers are of case-hardened steel. The retainer is fitted with a patented ball bearing and spring lock which holds the punch or die securely but permits easy changing without removing the die from the press. Interchangeable punches are of water-hardened steel, rigidly tested and inspected. Carried in stock in a wide range of standard sizes. Special size retainer plates, punches and dies made to order. Write for the complete R-B catalog.

"IT'S AN ALLIED PRODUCT"



Illustrated above is a complete Richard Brothers Interchangeable Punch and Die assembly showing the method of releasing either the punch or die simply by depressing the ball bearing with the special hand tool provided.

"SERVICE WITH A PUNCH"

"ROCKWELL" HARDNESS TESTER



Shipment in One Week !

This vastly improved new model is available in four sizes and is faster and more convenient than any older model of the "ROCKWELL" Hardness Tester.

WILSON
MECHANICAL INSTRUMENT CO., INC

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PRECISION CENTERED EYE BENDING

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DI-ACRO BENDERS

DI-ACRO precision bending is accurate to .001" for duplicated parts. DI-ACRO Benders bend angle, channel, rod, tubing, wire, moulding, strip stock, etc. Machines are easily adjustable for simple, compound and reverse bends of varying radii.

Send for Catalog "DIE-LESS DUPLICATING"

showing many kinds of "DIE-LESS DUPLICATING" produced with DI-ACRO Benders, Brakes and Shears.



A Centered EYE in 1 Operation

The DI-ACRO Bender makes perfectly centered eyes from rod or strip stock at the rate of up to 1000 an hour. Both eye and centering bend are formed with one operation. Any size eye may be formed within capacity of bender and ductile limits of material.



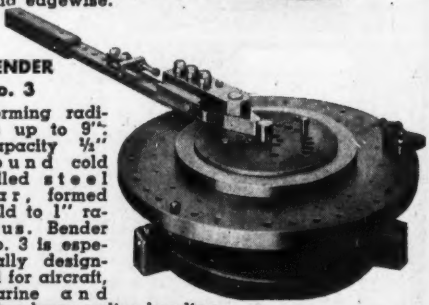
BENDER No. 1

Forming radius up to 2". Capacity 7/32" round cold rolled steel bar or equivalent. All DI-ACRO Benders have two - way action, right or left hand mounting and reversible forming nose.



BENDER No. 2

Forming Radius up to 6". Capacity ½" round cold rolled steel bar, formed cold to 1" radius. DI-ACRO Benders form bus bar and other strip stock both flat and edgewise.



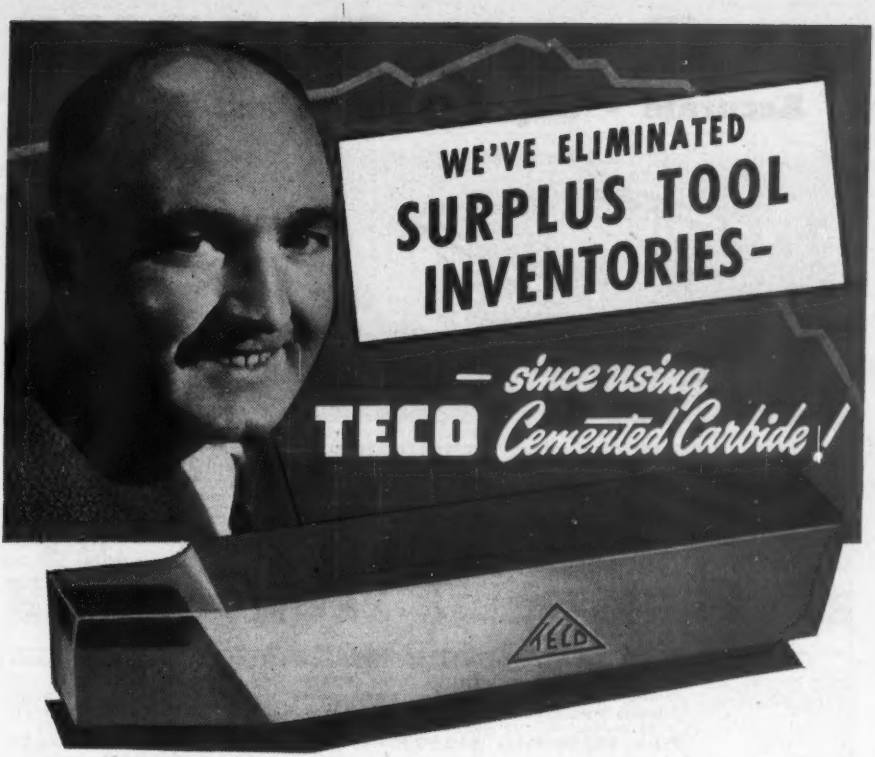
BENDER No. 3

Forming radius up to 9". Capacity ½" round cold rolled steel bar, formed cold to 1" radius. Bender No. 3 is especially designed for aircraft, marine and other large radius bending.

DI-ACRO PRECISION MACHINES DIE-LESS DUPLICATING

O'NEIL-IRWIN MFG. CO.

306 8th Ave., S., Minneapolis 15, Minnesota



WHEN you use TECO Cemented Carbide tools, you'll find it unnecessary to maintain excessive reserve stocks of cutting tools. You actually get *more* production with *fewer* tools, because TECO Cemented Carbide stays on the job longer—produces more pieces than any other cutting material.

Extremely hard, dense and uniform in structure, TECO Cemented Carbide has unusual resistance to wear and breakage in high speed turning, boring and facing operations.

Our manufacturing facilities assure prompt and dependable shipment to meet your production requirements. Grades, styles and sizes for practically every machining need.

Write today for catalog giving full specifications.

ARMY E NAVY

TUNGSTEN ELECTRIC CORPORATION 562 39th Street, Union City, N. J.

Branch Office: 2906 Euclid Avenue, Cleveland, Ohio

Representative: Architects & Builders Bldg., Indianapolis, Ind.

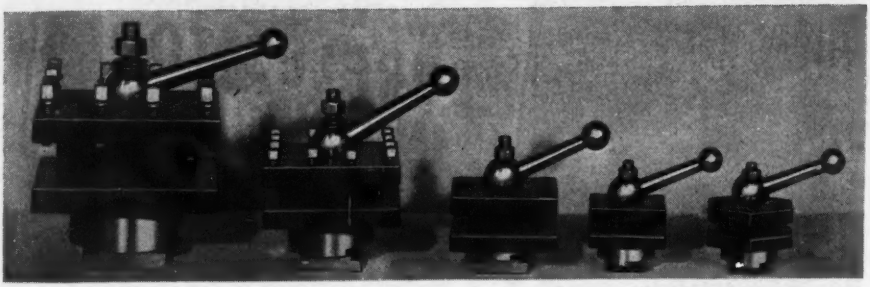
TECO CEMENTED CARBIDE

Pioneers in Tungsten Carbides for over a Quarter Century

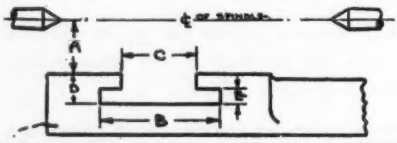
TECO

ENCO Turret Tool Posts

Accurate • Dependable • Cost-Saving



"A" Dimension range (from diagram on this page)	Model 6-S	Model 4-S	Model 3½-S	Model 2½-S	Model H
	2"—3-1/8"	1-9/16"—2-1/2"	1-1/8"—1-3/4"	7/8"—1-5/16"	7/8"—1-5/16"
Lathe Swing	16" swing & up	13" to 16" swing	10" to 13" swing	Bench Lathe	Bench Lathe
Maximum tool bit size	1" or 1-1/4" 1-3/8" toolholder for 3/8" bit (Where no tool bit size is specified, turret will be furnished for 1 inch tool bit)	3/4" or 5/8" (Where no tool bit size is specified, turret will be furnished for 5/8 inch tool bit)	1/2" Sq.	3/8" Sq.	3/8" Sq.
SPECIFICATIONS	4 tool 12 position 6" square Packed in carton Shipping Weight 35 pounds	4 tool 12 position 4" square Packed in carton Shipping Weight 12 pounds	4 tool 12 position 3-1/2" square Packed in carton Shipping Weight 8 pounds	4 tool 12 position 2-1/2" square Packed in carton Shipping Weight 4 pounds	6 tool 12 position 3" Hex Packed in carton Shipping Weight 4 pounds
	Price . $99.00	Price . $49.50	Price . $35.00	Price . $23.00	Price . $25.00



Make of Lathe and Size	A	B	C	D	E	Maximum tool size desired

One-week delivery on ENCO Turret Tool Posts made to specifications. When ordering, furnish all required dimensions and tool size desired.

- 12 position indexing
- 3 positions for each tool
- Carburized hardened steel construction
- Mounts rigidly in compound T-slot
- Keeps setting accurately
- Indexing is self-contained. Eliminates all chip interference

IMMEDIATE DELIVERY

on Turrets for these lathes:

Atlas • South Bend • Logan Sheldon • Clausing

Also all models with semi-soft base on center post for quick adaption to your lathe.

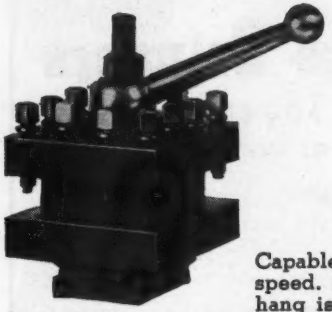
Most ENCO dealers carry complete stocks of the above Turret Tool Posts and ENCO Tailstock Turrets. Chicago and New York offices too can make immediate shipment.

ENCO MANUFACTURING COMPANY, Dept. Q

General Office and Factory:
3321-23 MONTROSE AVE., CHICAGO 18, ILL.

Eastern Sales Office: (Complete stocks carried)
118 E. 28th ST., NEW YORK 16, N. Y.

ENCO Heavy Duty



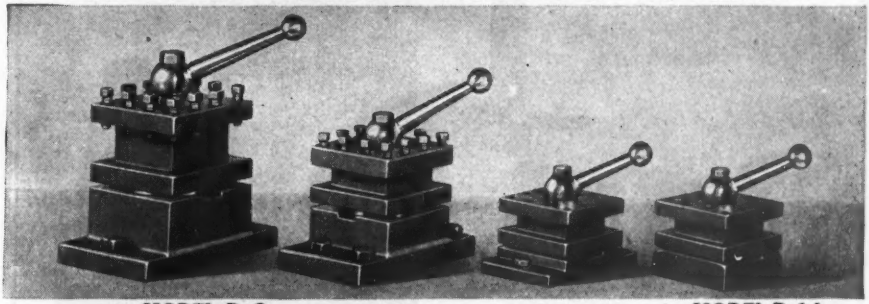
SPECIFICATIONS	HD-1	HD-2
Size of turret block	4-1/2" Sq. 3" thick	6-1/2" Sq. 4-1/4" thick
Range of tool slot height	1" or 1-1/4"	1-1/4" to 1-3/4"
Tool Size Range	3/4"—1"	1"—1-1/2"
"A" Dimension Range	2"—3-1/4"	3"—4-1/2"
Maximum "C" Dimension	2-3/4"	4"
Price	**$99.00**	**$130.00**
Shipping Weight	20 lbs.	45 lbs.

Capable of taking the strain of hogging cuts under high speed. Designed to mount maximum tool bits. Tool overhang is cut to minimum in these heavy duty models by the tools being mounted directly over the base of the turret. This increases the tool rigidity, permitting a heavier cut which reduces lathe time. 12-position tool indexing adds versatility to the rugged design of this accurate, cost-saving tool.

Models HD-1 and HD-2 can be shipped from stock with semi-soft base which can quickly be adapted to your lathe. Two weeks required for turrets fitted from specifications. When ordering turrets to specifications please furnish all dimensions shown on the lathe specification chart. Be sure to specify maximum tool to be used.

ENCO CROSS-SLIDE TURRETS

for Turret Lathes and Screw Machines



	MODEL D-3 for HEAVY DUTY	MODEL D-2	MODEL D-1	MODEL D-1 for LOGAN TURRET LATHES
Size of Turret Block	4½" square 3" thick	4 square 2¼" thick	3½" square 1¾" thick	3½" square 1¾" thick
Tool Size Range	up to 1¼" tool or 1⅜" toolholder for ⅜" bit	⅝" or ¾" tool	⅜" or ½" tool	⅜" tool
Price	**$129.00**	**$79.50**	**$59.50**	**$52.50**
Shipping Wt.	35 lbs.	20 lbs.	11 lbs.	9 lbs.

ENCO Cross-Slide Turrets for Screw Machines and Turret Lathes increase the tool capacity of the cross-slide 4 to 1. Each of the 4 tools mounted in the turret block has 3 different working positions. Each of these tools may be used for more than one operation reducing set up and grinding time. The base is bolted rigidly to the front of the cross-slide and keyed in place. The turret block and center post are carburized hardened steel and designed to give long and accurate service with minimum care.

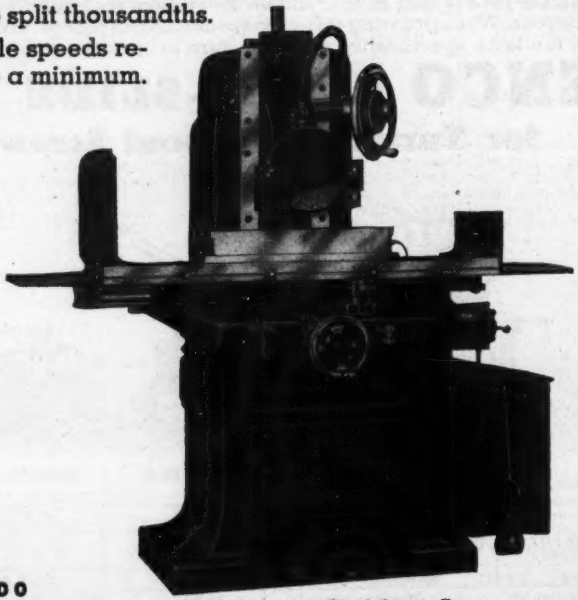
Write for Turret Lathe Chart to Assure Accurate Fitting To Your Lathe

Hydraulic feed

GRAND RAPIDS Surface Grinders

To Meet 1944's Exacting Needs --- as nothing else can

- "Grand Rapids" Hydraulic Feed Surface Grinders guarantee tool room accuracy at table speeds up to 125 feet per minute.
- Heavy rugged one-piece column and base casting assures permanent alignment between the cross travel ways and the upright head.
- Patented vertical movement of wheel head makes it possible to split thousandths.
- Two usable spindle speeds reduce wheel costs to a minimum.



No. 35 Precision Tool Room Type

WRITE FOR CATALOG GL-100

GALLMEYER & LIVINGSTON CO.

308 STRAIGHT AVE. S. W. GRAND RAPIDS 4 MICHIGAN



. . . give full spindle hole capacity on lathes up to 1 ½" size.

Allison Collet Chucks require no keys, wrenches, reverse switching or stopping at any time during operation. Collets can be easily and safely changed while lathe is in operation—only collet and nose seat revolve. Exacting tolerances are easily maintained—entire chuck assembly extends but two inches beyond spindle.

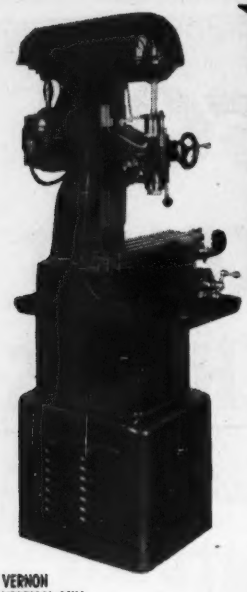
Allison collets—round, hexagon, square and serrated—are available for immediate delivery. Order direct from your distributor.

ALLISON TOOL & ENGINEERING CO.
4031 Whittier Blvd. • Los Angeles, California



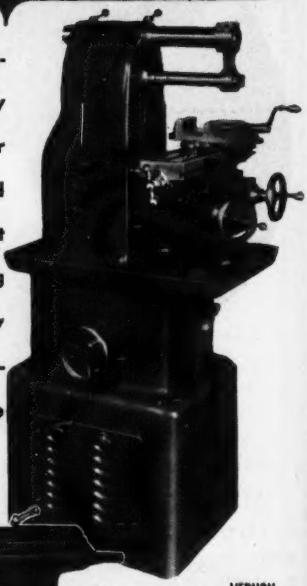
AMERICA'S FAVORITE PRODUCTION WEAPONS

Vernon MACHINE TOOLS

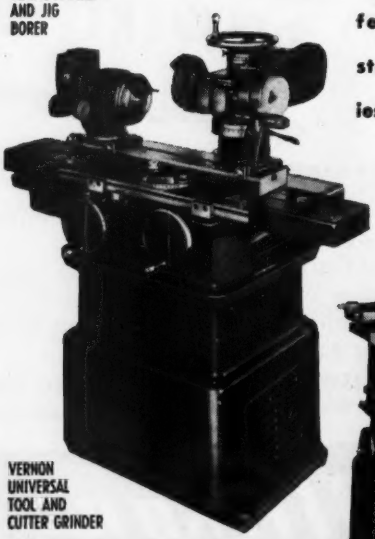


VERNON VERTICAL MILL AND JIG BORER

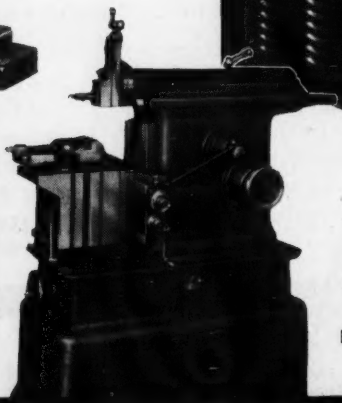
Low in cost—high in production • Split-hair accuracy with an abundance of power • Economical and long lived operation • All important engineering and operating features • Many standard accessories for each machine



VERNON PRECISION NO. 0 MILL



VERNON UNIVERSAL TOOL AND CUTTER GRINDER

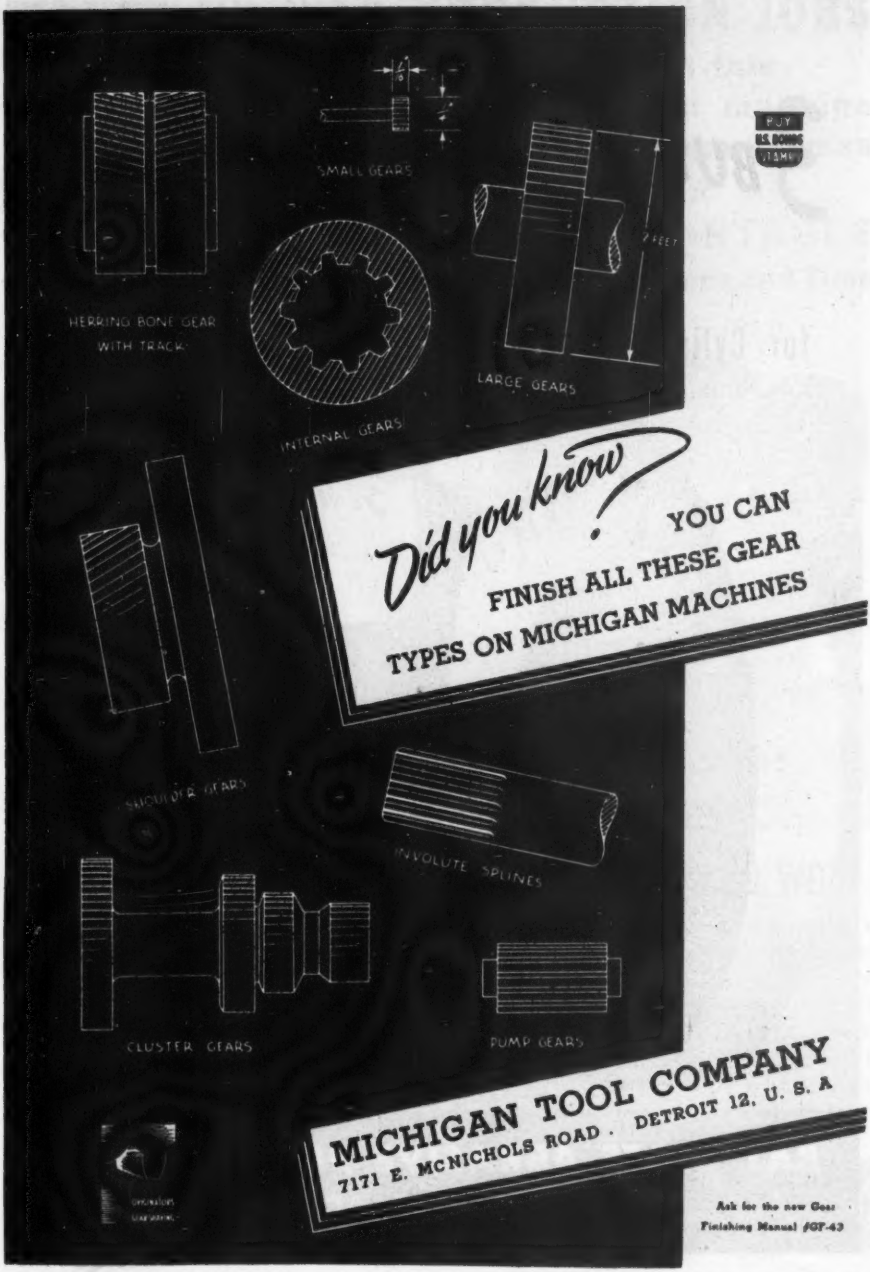


VERNON PRECISION BACK-GEARED 12" SHAPER

MACHINERY MANUFACTURING COMPANY

1915 EAST 51st STREET • LOS ANGELES 11, CALIFORNIA

Vernon Line of HORIZONTAL MILLS, VERTICAL MILLS and JIG BORERS, SHAPERS and GRINDERS


BUY
U.S. DEFENSE
STAMPS
SMALL GEARS
HERRING BONE GEAR
WITH TRACK
INTERNAL GEARS
7 FEET
LARGE GEARS
Did you know
YOU CAN
FINISH ALL THESE GEAR
TYPES ON MICHIGAN MACHINES
SHOULDER GEARS
INVOLUTE SPLINES
CLUSTER GEARS
PUMP GEARS
MICHIGAN TOOL COMPANY
7171 E. McNICHOLS ROAD . DETROIT 12, U. S. A
Ask for the new Gear
Finishing Manual #GF-43

3 BUILT-IN SUCCESS FACTORS

WHEELS for Cylindrical Grinding

1. Fractional Grades

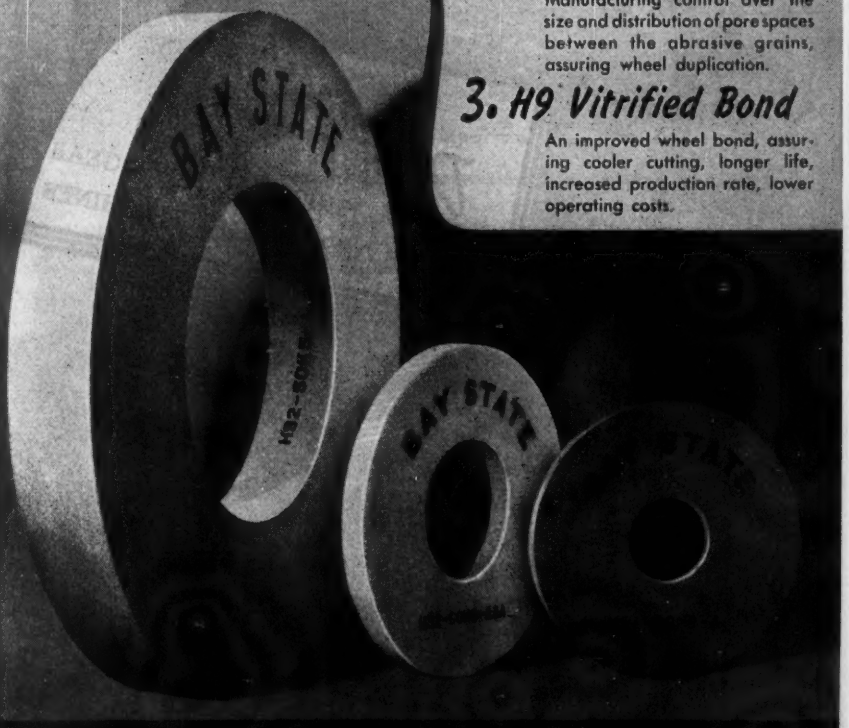
Three degrees of hardness in a single grade, offering a wider range for a more accurate wheel selection.

2. Controlled Porosity

Manufacturing control over the size and distribution of pore spaces between the abrasive grains, assuring wheel duplication.

3. H9 Vitrified Bond

An improved wheel bond, assuring cooler cutting, longer life, increased production rate, lower operating costs.



BAY STATE ABRASIVE PRODUCTS CO.

WESTBORO, MASSACHUSETTS

SPEED-UP WAR PRODUCTION JOBS

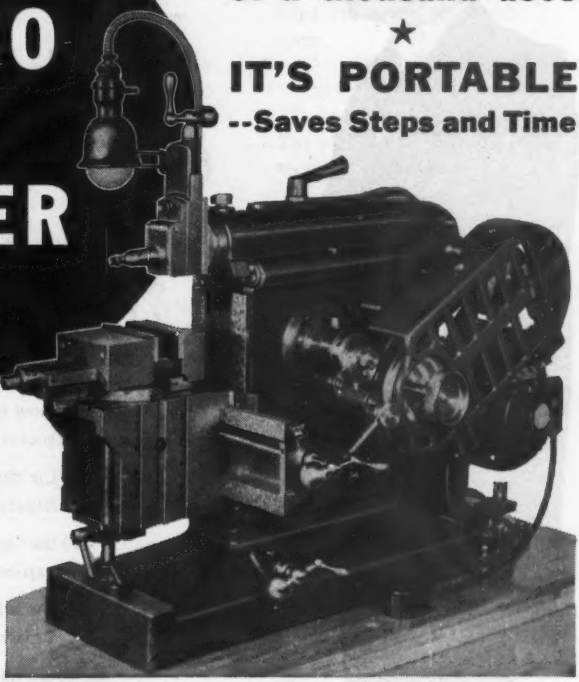
with this precision machine of a thousand uses

★

IT'S PORTABLE

--Saves Steps and Time

AMMCO 7" SHAPER





Just wheel up to bench -- plug in -- go to work!

On jobs requiring a stroke of 7" or less, the AMMCO 7" PRECISION SHAPER will enable you to save a lot of time and expense in a set-up which would be required for larger shapers. Furthermore, the AMMCO will enable you to get away from the cost of operating a big shaper on small work.

Portable Cabinet, as shown above at left, available as optional equipment, enables this shaper to be moved about the shop. It can be rolled from one job to another, and can be brought right up to machine or bench where man is working...Write today for specifications and prices.

ARMY E NAVY

AUTOMOTIVE MAINTENANCE MACHINERY CO.
2100 Commonwealth Ave.—North Chicago, Illinois, U. S. A.



—then he said to himself

"The LIE is my political weapon"

At the start of his activity, Adolph Hitler proclaimed to the world that his weapon was the LIE

—the all-out undiluted LIE

—and now see what happens to a structure founded on bosh:

(a) the theory of the blitz *blasted*

(b) the legend of invincibility *exploded*

(c) the infallibility of his "intuitions" *fizzled.*

He could have fooled a lot more people for a lot longer time, if he had only tried the trick of nursing along old truths—now turned into fallacies—but still adhered to by the unthinking majority.

For *Progress* has a way of flipping the FACTS of yesteryear into FLOPS almost overnight. The follower of an OUTDATED fact may easily find himself nursing a progress-blocking FLOP.

Here, Adolph, are samples
of yesteryear FACTS now turned FLOPS

FLOPPED FACT 1:
"You can't produce all-welded ships" . . . . . .



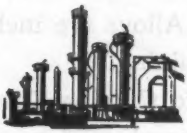
....Recourse to arc welding has filled the seven seas with them.

FLOPPED FACT 2:
"You can't arc weld high-temperature, high-pressure piping" . . . . . .



....The one safe way is through recourse to arc welding.

FLOPPED FACT 3:
"You can't weld cracking stills" . . . . . .



....Without recourse to arc welding—our armed forces would be without high octane gas.

FLOPPED FACT 4:
"You can't produce army tanks with arc welding" . . . . . .



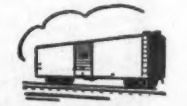
....Through recourse to arc welding—it's the only kind they're producing today.

FLOPPED FACT 5:
"You can't erect buildings by arc welding". . . . . .



....Savings in steel and money are represented in thousands of structures of every type—through recourse to arc welding.

FLOPPED FACT 6:
"Railroad cars are taboo for arc welding". . . . . .



....Watch them rolling the rails in every state—through recourse to arc welding.

THE LINCOLN ELECTRIC COMPANY • CLEVELAND 1, OHIO

America's greatest natural **recourse**

ARC WELDING

How to get the most out of

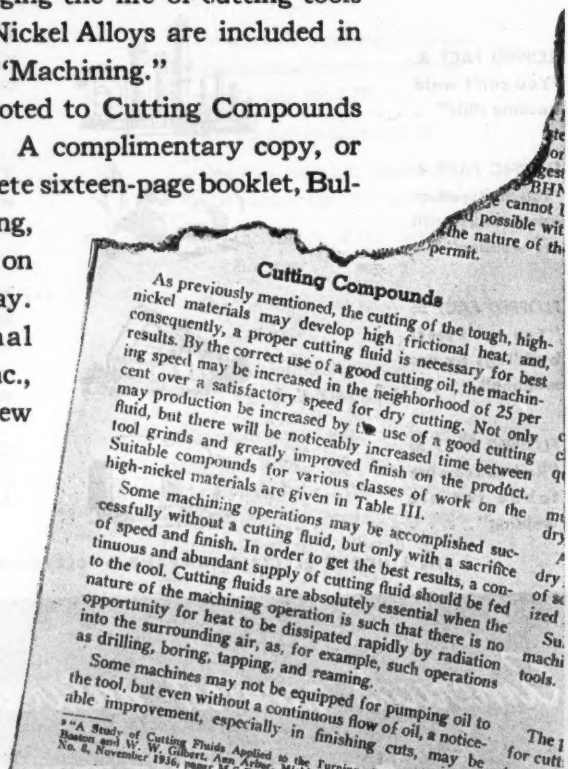
CUTTING TOOLS

when machining the High-Nickel Alloys

Tools are weapons . . . TREAT 'EM RIGHT!

Practical methods for "treating 'em right," methods for prolonging the life of cutting tools used on the High-Nickel Alloys are included in the INCO Bulletin, "Machining."

The section devoted to Cutting Compounds is reproduced here. A complimentary copy, or copies, of the complete sixteen-page booklet, Bulletin T-12, Machining, will be sent to you on request. Write today. The International Nickel Company, Inc., 67 Wall Street, New York 5, N. Y.



Cutting Compounds

As previously mentioned, the cutting of the tough, high-nickel materials may develop high frictional heat, and, consequently, a proper cutting fluid is necessary for best results. By the correct use of a good cutting oil, the machining speed may be increased in the neighborhood of 25 per cent over a satisfactory speed for dry cutting. Not only may production be increased by the use of a good cutting fluid, but there will be noticeably increased time between tool grinds and greatly improved finish on the product. Suitable compounds for various classes of work on the high-nickel materials are given in Table III.

Some machining operations may be accomplished successfully without a cutting fluid, but only with a sacrifice of speed and finish. In order to get the best results, a continuous and abundant supply of cutting fluid should be fed to the tool. Cutting fluids are absolutely essential when the nature of the machining operation is such that there is no opportunity for heat to be dissipated rapidly by radiation into the surrounding air, as, for example, such operations as drilling, boring, tapping, and reaming.

Some machines may not be equipped for pumping oil to the tool, but even without a continuous flow of oil, a noticeable improvement, especially in finishing cuts, may be

[9] "A Study of Cutting Fluids Applied to the Turning of ... Boston and W. W. Gilbert, Ann Arbor, Michigan; Trans. ... No. 6, November 1936, paper M.S.P.-58-10.

THE INTERNATIONAL NICKEL COMPANY, INC.

ACHINING

treat-

TABLE III
Cutting Fluids

Operation	Cutting Lubricant*
Rough turning	Sulfurized, dry, or water soluble oil
Finish turning	Sulfurized, or water soluble oil
Rough planing	Water soluble, dry, or sulfurized oil
Finish planing	Water soluble, or sulfurized oil
Shaping	Sulfurized oil
Milling	Turpentine, or gasoline
Drilling under ¼ in.	Sulfurized oil (cut), or lard oil
Drilling ¼ in. to ¾ in.	Sulfurized, or water soluble oil
Drilling over ¾ in.	Sulfurized oil
Threading	Sulfurized oil
Tapping	Sulfurized oil
Boring	Sulfurized oil
Reaming	Sulfurized oil
Broaching	Sulfurized oil
Cold sawing (Low-speed circular saw)	Sulfurized, or water soluble oil
Cold sawing (Hack saw, etc.)	Water soluble oil
Grinding	

* For the operations where there are two or more cutting lubricants suggested, the one mentioned first is considered preferable.

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obtained by covering the metal with a heavy, sulfurized oil before each cut.

Sulfurized oil should always be used as a coolant for automatic screw machine work on the free-machining alloys "R" Monel and "KR" Monel.

Discoloration which may be produced by sulfurized oil can be removed readily by soaking the work from 20 to 30 minutes in a cold 10 per cent solution of sodium cyanide. Since this solution is poisonous, great care should be exercised in its use.

All lubricants should be removed completely from the machined pieces that are to be subjected to high temperatures, either during subsequent fabrication, or in service.

Following are some of the interesting results of tests by O. W. Boston and W. W. Gilbert[3] concerning the influence of cutting fluids in turning Monel.

A rich emulsion of one part of soluble oil to 15 parts of water materially increase : the cutting speed values for any tool life over those of the lean mixtures composed of one part of soluble oil to 50 parts of water.

It appears that an emulsion is entirely satisfactory as a utting fluid for turning Monel. The sulfurized mineral oil aused the chips to coil closer and break up more fre-ently.

The use of a rich emulsion of soluble oil permitted maxi-m increase of 22.7 per cent in the cutting speed over cutting speed.

ll cutting force components are highest when cutting : they are intermediate when cutting with an emulsion luble oil; and are lowest when cutting with the sulfur-mineral oil.

fur-bearing lubricants should not be used when ning the high-nickel alloys with cemented carbide

Cutting-Off Operations

ower hacksaw is t
ng such forms
red fe



INCO NICKEL ALLOYS

MONEL • "K" MONEL • "S" MONEL
"R" MONEL • "KR" MONEL
INCONEL • "Z" NICKEL • NICKEL
Sheet..Strip..Rod..Tubing..Wire..Castings

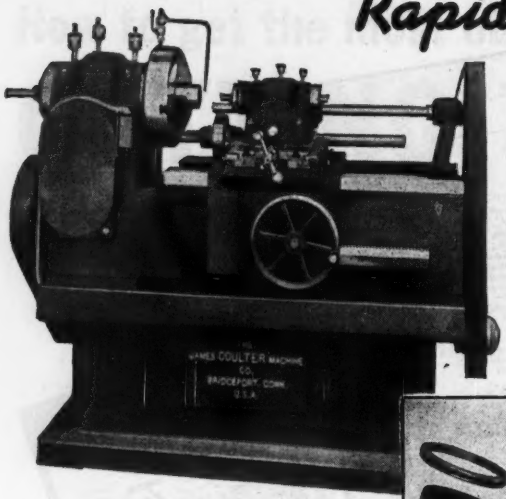
67 WALL STREET, NEW YORK 5, N. Y.

Rapid Duplication

of

RIGHT OR LEFT HAND THREADS

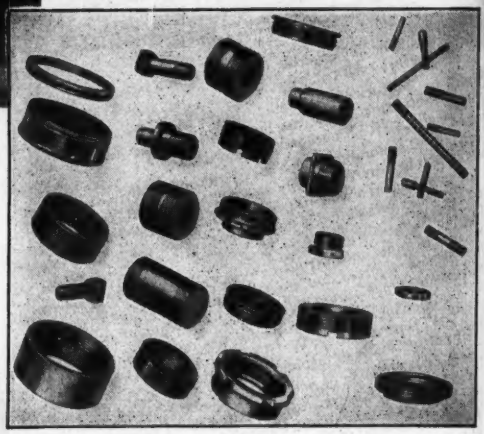
INTERNAL OR EXTERNAL



COULTER

Type "H"





Any parts that can be held in ordinary chucks, air operated chucks, air operated collet chucks, or special face plate fixtures . . . can be threaded on this machine.

Set cam-controlled automatic cycle on first piece. Thereafter, cutter feeds into work to proper depth and at correct pitch and withdraws when cut is completed. Work and cutter spindles are driven by individual motors through worm drive, affording ample power throughout the wide range of feeds and speeds.

Write for complete specifications.

The James **COULTER** *Machine Co.*

BRIDGEPORT • CONNECTICUT • U.S.A.

Give them Extra Care



....to Get Longer Tool Life and to Help Solve the Tool Shortage

It isn't easy to get new tools these days because the demand exceeds manufacturers' capacities to produce them. Thus, each added hour of service a tool can be made to give by a little extra care makes a tool available for use just that much longer.

So try giving tools a little extra care. Handle them carefully. Don't drop or throw them loosely into a drawer or let their accuracy be impaired by sudden jolts. Keep fine tools in the boxes in which they are packed to prevent injury and do not measure moving work or in places where a tool may be injured by a revolving cutter.

A little added care from each tool user will increase tremendously the number of tools available for war work. It's a patriotic duty to protect precision tools today.



Reproductions of this advertisement for use on your bulletin boards furnished on request.

BROWN & SHARPE TOOLS



Green Help produces *More, Faster* with Apex Safety Friction Tapping Chucks

Even inexperienced operators work *faster* and *better* with Apex Safety Friction Tapping Chucks.

These chucks minimize tool breakage because they practically eliminate the hazard of overloading. Taps work safely, accurately, at top speeds on through or bottom holes.

Chucks are easily adjusted for different sizes of taps and, once adjusted, maintain proper tension over long periods. End thrust set up by tapping or pressure exerted by operator on spindle does not affect friction setting. Multiple friction discs have long service life.

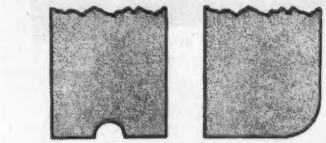
Use these chucks on reversible drill presses, radials, handscrews, etc., and save cutting tools. Catalog No. 14 on request.

APEX

THE APEX MACHINE & TOOL CO., DAYTON, OHIO

Manufacturers of Safety Friction Tapping Chucks, Quick Change and Positive Drive Drill Chucks, Vertical Float Tapping Chucks, Parallel Floating Tool Holders, Power Bits for Phillips, Slotted Head and Clutch Head Screws, Hand Drivers for Phillips and Clutch Head Screws, Aircraft Universal Joints, Plain and Universal Joint Socket Wrenches.

Engineered Diamonds!





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Accurate Radii —

• The form produced by a radius dresser is only as accurate as the diamond used to dress that radius form. It is because Wheel Trueing engineers know this—because they know the importance of extreme accuracy and precision in radius forming operations that the diamonds used in Wheel Trueing Radius Forming Tools are selected with the greatest care according to the particular radius each is to dress.

But careful selection of diamonds alone is not enough! The diamonds in these tools are set by experts who make certain that each diamond is concentric with the shank. And throughout the various manufacturing operations, these tools are subjected to rigid tests and careful inspections by men whose skill, experience and engineering knowledge cover the fields of industrial diamonds and grinding wheels. These men know diamonds! They know the production man's problems! They know how to design and manufacture tools to solve those problems!

Next time you buy radius forming diamond tools specify Wheel Trueing. You'll be assured of utmost precision, accuracy, dependable performance and money-saving economy. You'll get radius forming tools *engineered to your jobs!*

Other Wheel Trueing products include diamond tools for straight or form dressing—thread dressing—contact gauges—and drill bits for coring or blasting.

WHEEL TRUEING TOOL COMPANY

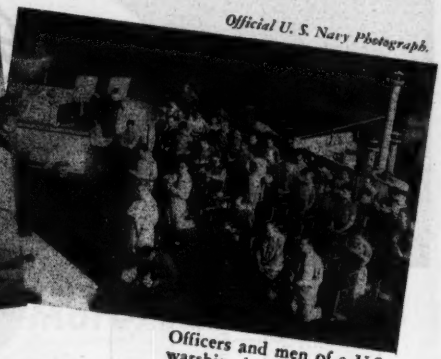
3200 W. Davison Ave. Detroit 6, Michigan

Official U. S. Signal Corps Photograph.



On the alert; soldiers attend church fully equipped.

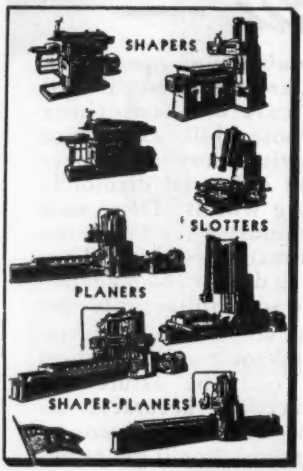
Official U. S. Navy Photograph.



Officers and men of a U.S. warship kneel in prayer

RECIPROCATING
Hy-Draulic
MACHINE TOOLS

For Peace on Earth . . . Soon
Good Will Toward Men, Always



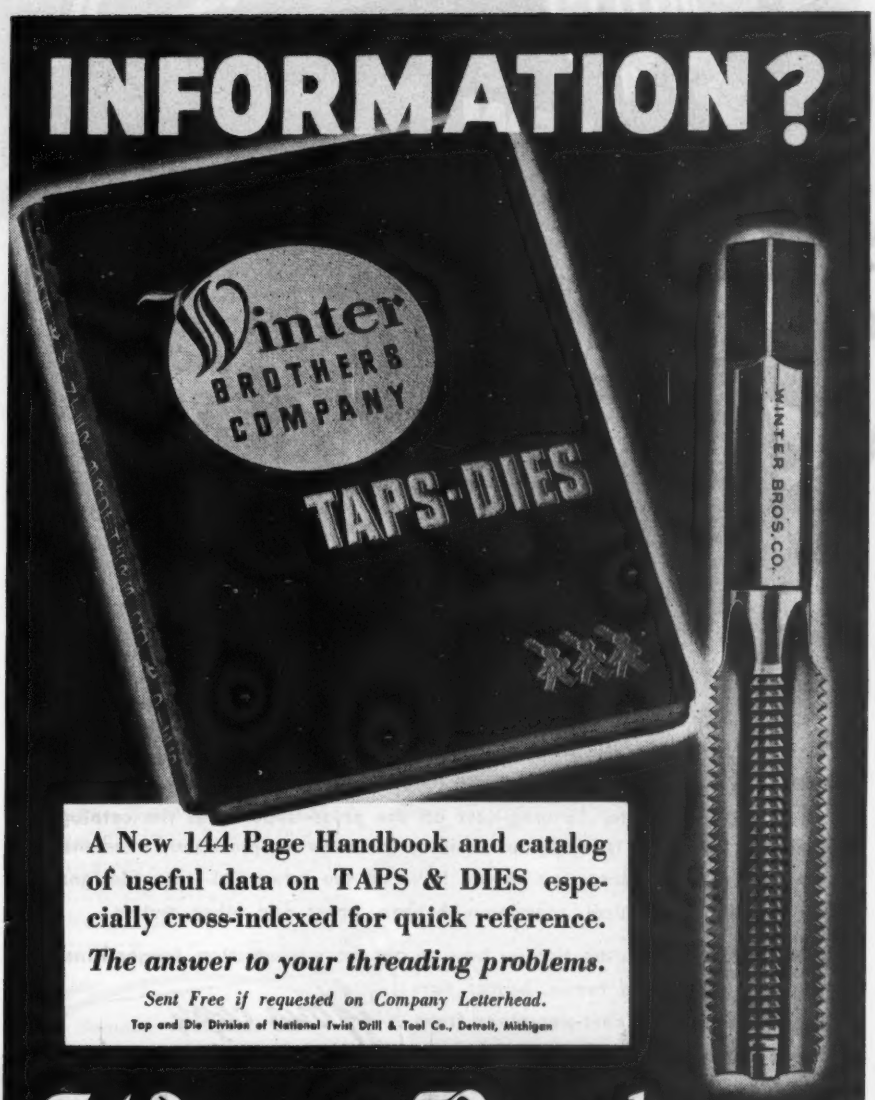
New Years, Christmas, Thanksgiving . . . War knows no holidays. But they who fight the battles pause to pray, and that is good. Likewise all of us who make the tools and weapons for war might well pause and pray for lasting peace on earth with good will toward men. And we should *look to our tools* carefully, as our brothers-in-arms look to their weapons, so that we shall maintain peak production of everything needed to win victory and peace soon.

What about your shapers, planers, slotters, shaper-planers? Have you enough for peak production on all war work? Have you any that are obsolete or badly worn? Unless you have *enough,* for sure; and all of *latest design,* good-as-new . . . then investigate Hy-Draulic Shapers, Planers, Slotters and Shaper-Planers. You will find exclusive Hy-Draulic features and advantages that give you maximum cutting and peak production on a wide variety of military jobs now and on commercial work after victory. Write today for details. Just mention the type of tool you can use, and ask for Bulletin 1605.

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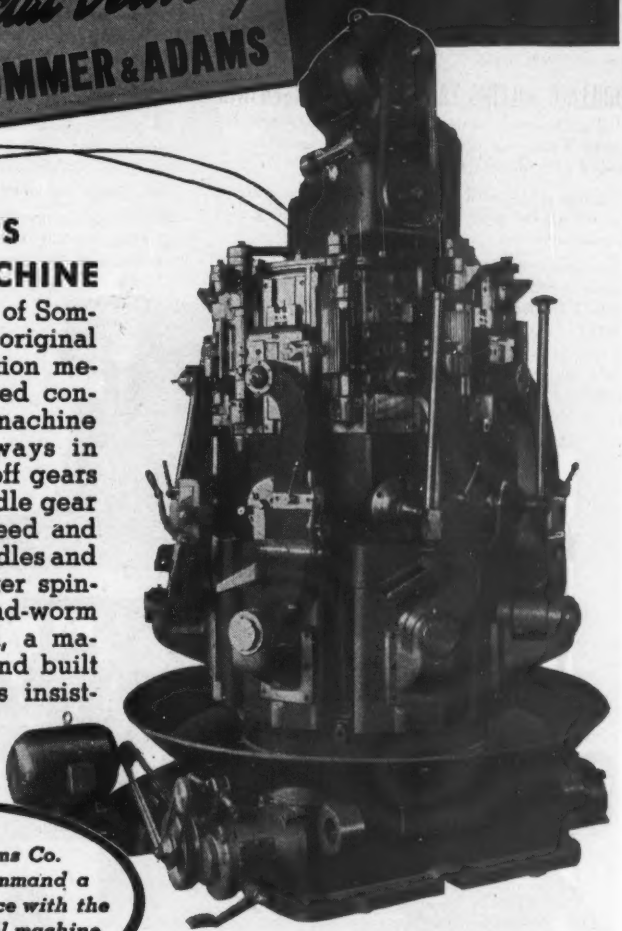
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DRILLING, MILLING, TAPPING, SCREW INSERTING

The accompanying photograph shows a Bodine #48-30 set-up for drilling and tapping holes for ⅛" pipe threads in forged steel spiders for universal joints.

One hole is positioned at an angle to another as indicated by the angular position of the horizontal drilling and tapping spindles.

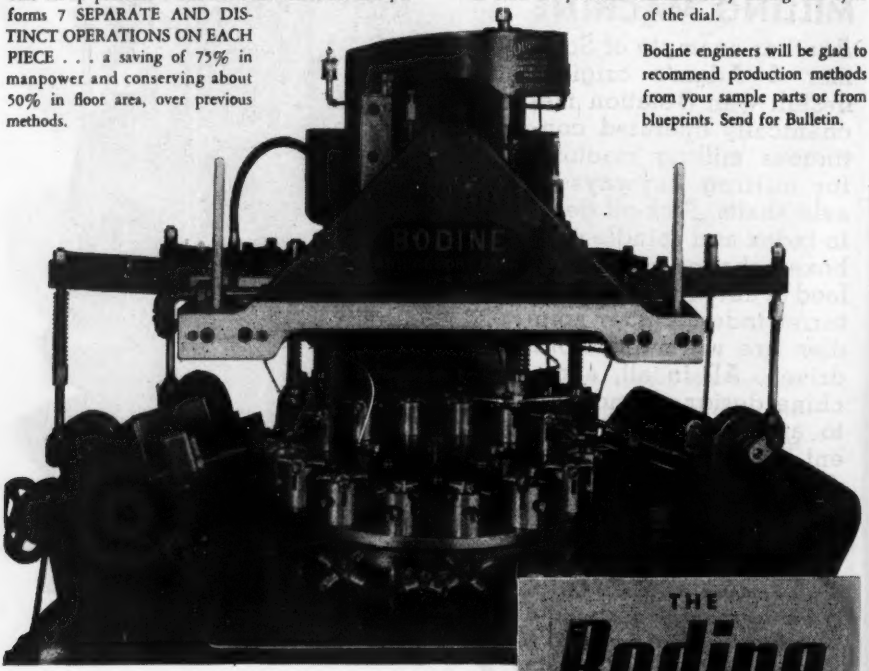
This set-up produces 7 PIECES PER MINUTE and performs 7 SEPARATE AND DISTINCT OPERATIONS ON EACH PIECE . . . a saving of 75% in manpower and conserving about 50% in floor area, over previous methods.

Parts are hand fed to fixtures on the horizontal dial which automatically indexes to seven spindles. Ejection is manual in this instance. With 6 standard Bodine sizes, carrying from 4 to 8 spindles, drilling and tapping up to ½" dia. and 3½" in depth, the set-up possibilities are almost endless.

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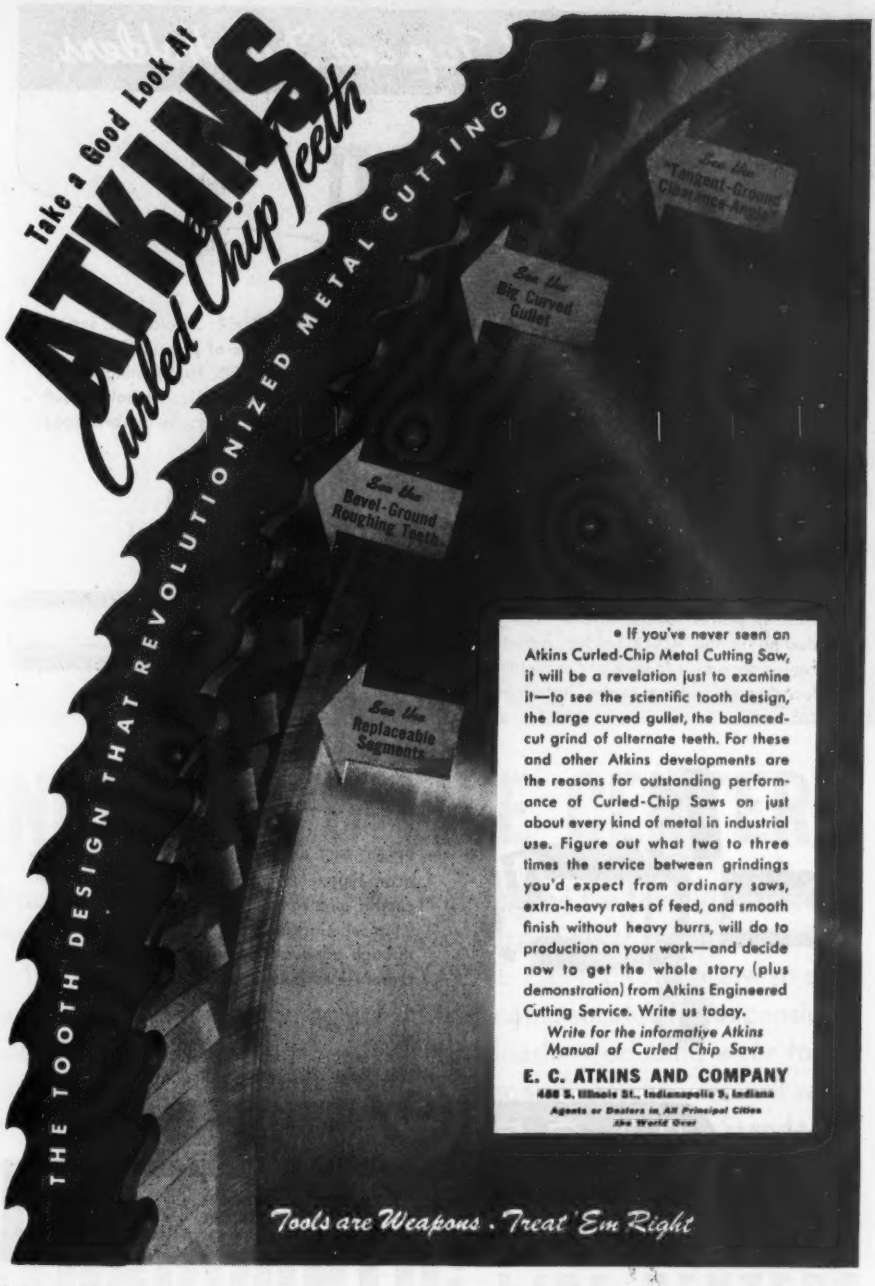
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See the Tangent-Ground Clearance-Angle
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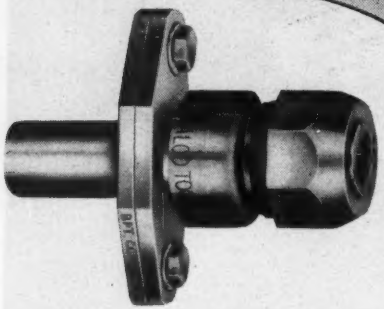
Releasing Model Tap and Die Holders

by

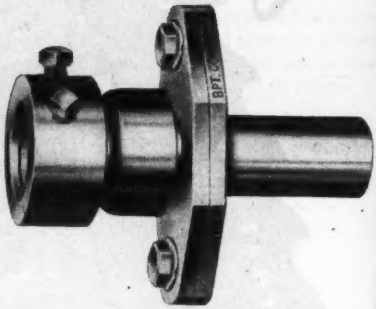
for HAND SCREW MACHINES

ALCO

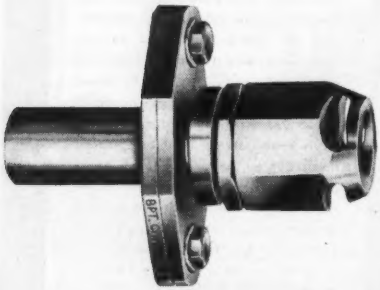
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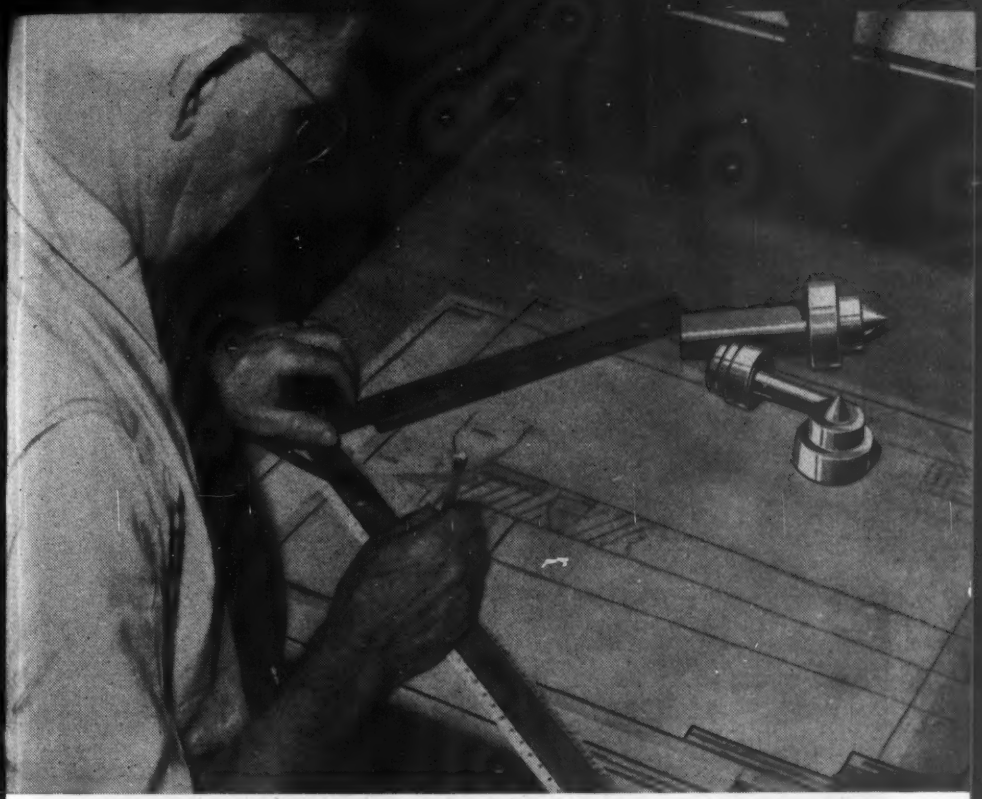


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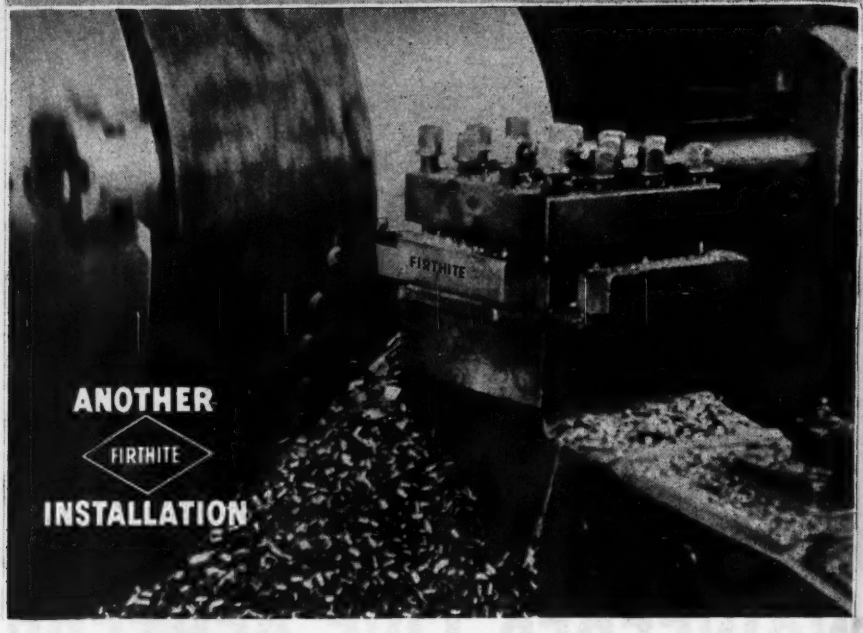


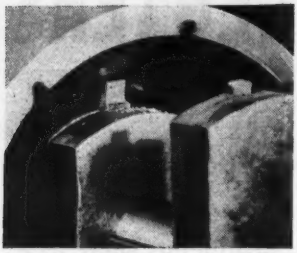
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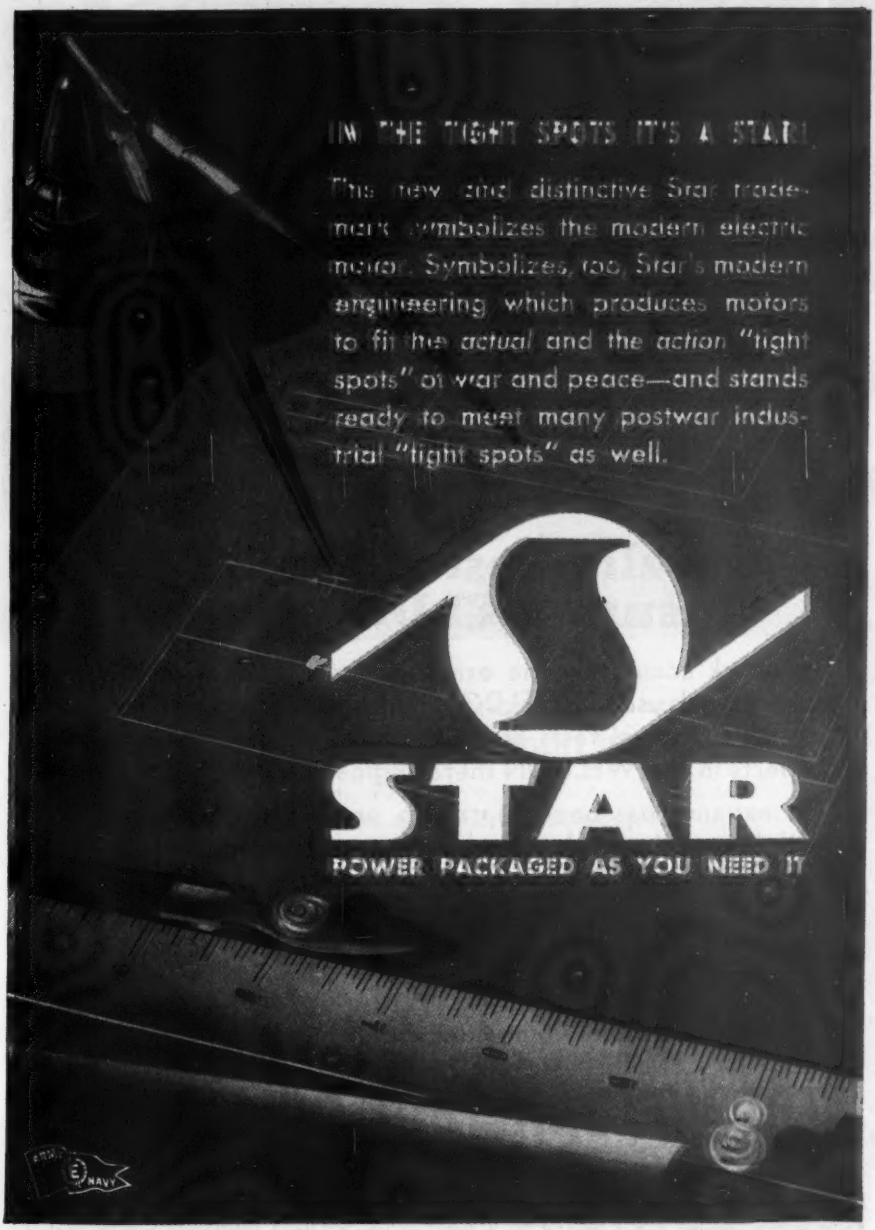


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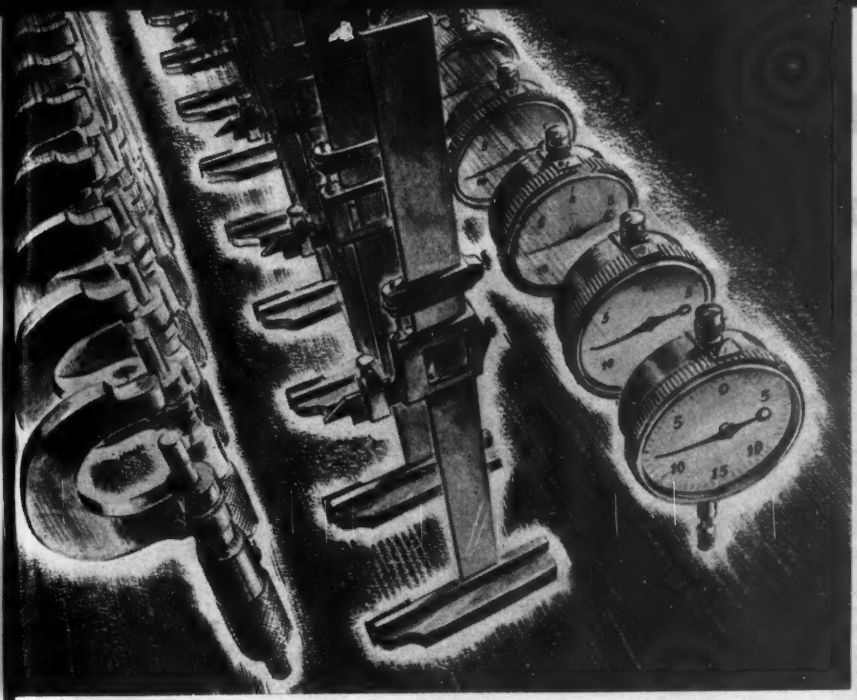
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